

Vol. 23, No. 11

November, 1926

THE  
PSYCHOLOGICAL BULLETIN

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PROCEEDINGS OF THE TWENTY-FIRST ANNUAL  
MEETING OF THE SOUTHERN SOCIETY FOR  
PHILOSOPHY AND PSYCHOLOGY, LEXINGTON,  
KENTUCKY, APRIL 2 AND 3, 1926.

Report of the Secretary-Treasurer, J. A. HIGHSMITH, *North Carolina College for Women, Greensboro, N. C.*

The Council of the Southern Society for Philosophy and Psychology met at the University of Kentucky, April 3, 8:30 A.M. There were present J. F. Miner, President; Herbert Sanborn, A. S. Edwards, Buford Johnson, Josiah Morse, J. A. Highsmith, Secretary-Treasurer.

The following recommendations were adopted:

- (1) For officers for the year 1926-27: President, A. S. Edwards; members of the Council, J. B. Miner and S. C. Garrison.
- (2) That twenty-two nominations for membership be approved and ordered reported to the business meeting of the Society.
- (3) That the following resolutions be submitted to the Society for adoption:

WHEREAS, a study of the teaching of psychology in colleges, state teachers' colleges and normal schools in the South reveals that psychology is taught in a number of institutions by teachers whose training has been inadequate; and whereas the equipment of laboratories, technical periodicals, etc., necessary for proper training in psychology has also been found to be inadequate (conditions which probably do not obtain in the South alone); therefore, be it resolved

1. That the Southern Society for Philosophy and Psychology hereby appoint a special committee with power to carry out these resolutions, consisting of Professor Joseph Peterson, of the George Peabody College for Teachers, as Chairman, and Professor Buford Johnson, of the Johns Hopkins University, Professor J. B. Miner, of the University of Kentucky, Professor T. K. Sisk, of the State Normal School, Livingston, Ala., and Professor W. J. Woodson, of the State Teachers College, San Marcos, Texas.
2. That the Society express its disapproval of the teaching of the first year's courses in psychology, educational psychology, and other branches of psychology, by anyone who has not had the training represented by at least a master's degree with a major in psychology; and also the teaching of advanced courses in these subjects beyond the first year's courses by anyone who has not had at least the training equivalent to a doctor's degree with a major in psychology.
3. That the Society ask all heads of departments in which these subjects are taught, whenever the question of transfer of credit from other institutions to theirs is raised, to disapprove the transfer of any credit in these subjects not taught by persons qualified as indicated above.
4. That the Society ask the above Committee to coöperate with the various institutions and the associations of colleges in every way possible in raising their standards in accordance with the above resolutions.
5. That the Society authorize the Council to appropriate such sums as are necessary for carrying out the intentions of the above resolutions.

BUSINESS MEETING, 2 P.M., APRIL 3, PRESIDENT MINER PRESIDING

- (1) On nomination of the Council the following officers were elected: President, A. S. Edwards; members of the Council, J. B. Miner and S. C. Garrison.
- (2) Twenty-two nominations for membership were made by the Council and accepted by the Society.
- (3) Members of the Society were reminded that the next meeting will be held at the University of Georgia.
- (4) The following amendment to the Constitution was adopted by the Society: That Article III—"Officers"—be amended to read as follows:

1. The officers of the Society shall be one year for the President and three years for the Secretary-Treasurer.
  2. There shall be a council composed of the President and Secretary-Treasurer, *ex-officio*, and six elected members, two of whom shall be elected annually for terms of three years.
  3. Vacancies in offices shall be filled by the Council.
- (5) The resolution proposed by the Council concerning the teaching of psychology was unanimously adopted by the Society.

#### ABSTRACTS AND PAPERS

*Comments on the Concept of Intelligence.* A. S. EDWARDS, University of Georgia.

Definition of intelligence in terms of success raises the questions of ambiguity and of fact; intelligence may correlate with either success or failure. As knowledge, association, and memory, we are led rather toward the habitual than the intelligent, and considering it as ability to learn we must also include ability to unlearn, to be critical, and to use what has already been learned. If we define in terms of valuable reactions, etc., we must not forget the numbers of wrong theories, hypotheses, etc., that are worked out by men of the highest intelligence.

Intelligence is but one factor in success, etc., and while satisfactory definition may not yet be made it appears from various considerations that a concept of intelligence must take cognizance of the facts of range or scope of response, modifiability, the presence of some such factor as insight, purpose, foresight, consciousness of end, or the like, and the idea of achievement as indicated, for example, by means of so-called intelligence tests. Genetically we may have intelligent acts without conscious processes, and it may differ from instinctive tendency only in degree. Suggestion is made that it is best considered as a practical concept concerned with achievement in terms of certain tests and thus considered in terms of what it does.

*The Relation Between Morality and Intellect.* CLARA CHASSELL COOPER.

This study was undertaken to discover whether the findings of investigators as to the correlation between desirable qualities, studied particularly in the field of mental abilities, hold also when the relation between morality and intellect is investigated.

The first part of the study is a summary of previous quantitative

and experimental studies, and undertakes a synthesis of recorded opinion and research regarding the relation between morality and intellect for both delinquent and non-delinquent groups. The remainder of the study consists of two original investigations; the method and the sources of data for these were as follows:

1. A study by the ranking method of approximately 1,000 students in 28 colleges and universities, judged by from one to six members of the faculty in their respective institutions, in the traits *morality in the broadest sense, intellect as shown in studies, and intellect as shown in activities other than studies.*

2. A study by the same method of more than 200 of these students, judged by a number of their classmates, in the traits *unselfishness, loyalty to school and friends, justice to all, courage in support of convictions, self-control, activity for social welfare, reliability, intellect as shown in studies, and intellect as shown in activities other than studies.*

3. A supplementary study of the relation between faculty and student judgments thus obtained, and college grades.

4. A determination of the correlation between scores on conduct scales and general intelligence tests in the case of more than 800 elementary school children.

The principal findings of the study were as follows:

1. The range of the correlations between morality and intelligence as found by various investigators, with a single element as the measure of morality, extended from .23 to .79. The average correlation was .47.

2. The range of certain correlations found for these traits, with two or more elements as the measures of morality, extended from .21 to .83, with a median of .51.

3. Partial correlations between conduct score and mental age with chronological age constant in the case of groups of feeble-minded children in two public schools, totaling 59 and 275 pupils, were .11 and .22, respectively; corresponding partial correlations for five regular grades in a private school, totaling 91 cases, and for certain regular grades and opportunity classes in a public school, totaling 247 pupils, were .35 and .55, respectively.

Thus the results from the most significant correlations reported in the investigation point to a relationship between morality and intellect when the study is confined to restricted groups, of approximately .50, and justify the conclusion that in this field also correlation and not compensation is the rule.

*The Age Factor among V. M. I. Freshmen and Some Intelligence Correlations.* ROBERT L. BATES, Virginia Military Institute.

Intelligence tests were given to the freshman class of Virginia Military Institute in September, 1925. The group of entrants, from the standpoint of age, represent a homogeneous group as the matriculates come from high schools, for the most part, direct to college. The test data yield coefficients of correlation between age and score that the distinctively negative,  $r = -.270 \pm .039$ . Two tests were employed and they mutually sustained each other. For the respective ages, beginning with the youngest, the general tendency is a diminishing of the average year-level score.

Comparisons of class marks and of examination marks with ages disclose a negative relationship,  $r = -.233 \pm .044$  and  $-.235 \pm .044$ . The average marks for the age levels disclosed the same general tendency as did test scores.

This study sustains Army findings. Where there is a selective group, chosen for an intellectual performance with intelligence qualifications (as work in college or duties as an army officer) the younger members, on the average, are the brighter as judged by tests, achieve more as judged by marks and incidentally are the more intelligent. The extent of retardation lends itself to measurement. In the group studied the four devices employed yielded results that were strikingly consistent.

*Predicting Success in Junior High School on the Basis of Success in the Grades.* S. C. GARRISON, George Peabody College for Teachers.

An attempt was made in this study to analyze, through the use of total and partial coefficients of correlation, regression and alienation the scores obtained from the National Intelligence Test, the Stanford Revision of the Binet-Simon Test, the Woody-McCall Mixed Fundamentals in Arithmetic Test and other educational tests. The analysis was made for the purpose of trying to discover in how far the scores made on the various tests in the fourth grade could be used to predict what a pupil would do in the junior high school. In the study 108 cases were used. These 108 children took all the tests given in each of the grades from the fourth through the ninth. The children were pupils in the Peabody Demonstration School and constitute a rather select group, the median I.Q. on the Stanford-Binet 112.

In general it was found that achievement tests in the fourth grade

could be used for the purpose of predicting success better than the intelligence tests. Neither gave a very satisfactory basis for prediction.

*Social Background and Success in College.* JOSEPH U. YARBOROUGH,  
Southern Methodist University.

In addition to mental ability and emotional ability workers in student personnel are becoming more and more interested in social background as a factor in determining success in college. Recent studies indicate that some 85 per cent of the gifted students come from favorable social backgrounds. Leaving out of account all speculation as to favorability, we set to work to determine what kind of social background gives us the most gifted student, and the least gifted.

In this preliminary report we present the results from a study of 335 cases. They were rated on the basis of scores made on the battery of tests prepared by the American Council on Education. Later these were checked against college grades, and the two ratings in turn against individual case studies. Results therefrom indicate that the positive factors in the social background which make for success are: (1) education of the father and mother, (2) number of brothers and sisters, (3) the community in which the student receives his early training, and (4) the economic certainty of the family. The relative significance of each of these factors is indicated.

*Endemic Goiter and Intelligence.* By ROBERT OLESON, United States Public Health Service, and MABEL R. FERNALD, Cincinnati Public Schools.

The present study was undertaken to secure such information as could be obtained from the available data regarding the relationship between size of the thyroid and what has been variously designated as intelligence, brightness or mental alertness. It does not touch upon the relationship of such mental conditions as nervousness, mental disturbances, psychopathic trends or the disturbances of personality. The data for the study were obtained from two independent investigations: the thyroid survey made in Cincinnati in 1923-1924 by the United States Public Health Service in coöperation with the Board of Health and the application of group intelligence tests to children of the sixth grade by the Psychological Laboratory of the Vocation Bureau of the Cincinnati Public Schools. These two pieces of work

were carried on independently for their bearing on other problems. It was not until both undertakings were completed that it was realized that they might throw light on one another and that the effort was made to discover the significance of their combined findings. For this reason certain phases of the problem were not investigated which might have been considered if the study had been undertaken as a single investigation.

The degree of thyroid enlargement was designated in accordance with the standards evolved during the Cincinnati survey. In this system progressively larger thyroids are represented by the numerals from 1 to 5, indicating respectively very slight, slight, moderate, marked and very marked sizes from what is assumed to be normal. The indices of intelligence utilized were two: first, school retardation or advancement as indicated by the ages of children in the given school grade, and second, the record made in a standard group test, designed to measure intelligence. The Otis Advanced examination was the test used and the measure used in making comparisons with thyroid status was the percentile rank of a given child among a standard group of children of his own age.

The total number of sixth grade children included in the study was 3,796, distributed as follows: 1,728 white boys, 1,630 white girls, 174 colored boys, and 264 colored girls.

Since all of the children were in the sixth grade, their ages served as evidence of their academic retardation or advancement. Comparison was made first between the group of thyroid-normal children and the group of those with any degree of thyroid enlargement to see whether either group showed a greater tendency toward academic retardation than the other. The difference appeared to be very slight and not constant in direction. Among both white and colored boys the median ages were slightly less among those with thyroid enlargement than among those classified as thyroid-normal. With both white and colored girls, the shade of difference was in the reverse direction. A further comparison was made in the case of the white boys and girls for the different degrees of thyroid enlargement. In the case of both boys and girls, those with marked enlargement showed higher median ages (greater academic retardation) than did those with slight enlargement or with normal thyroids. However, the number of children with marked thyroid enlargement was sufficiently small so that the significance of these figures is questionable.

Comparison was made between children with normal sized

thyroids and those with enlargements, with reference to percentile rank on the Otis examination. In the case of white boys and girls, comparison was made for the separate ages as well as for the total group. This was not done for the colored children because of the smaller number of cases. It was found that the majority of differences between thyroid-normal and thyroid-enlarged groups were very small and that the direction of difference was not constant. Among the white boys and girls, the slight advantage was in favor of the thyroid-normal group while among the colored boys and girls, the advantage which is larger is in the opposite direction. In the various age groups there is also a lack of consistency in direction. In all of the age groups of the white boys the difference which exists is in favor of the thyroid-normal group. In the case of the girls on the other hand the situation is reversed except in the case of one age group, the twelve-year group.

Comparison was further made in terms of percentile rank for the various *degrees* of thyroid enlargement, classified under three heads, slight, moderate and marked. When either distributions or medians are compared, there is noted a tendency toward a drop in percentile rank for the children with marked enlargements as compared with those having only slight or moderate enlargements or with normal thyroids. The numbers of cases in the groups of marked enlargement, however, are so small as to throw some question on the significance of these findings.

Summarizing, it may be said that the findings of this study are negative in that no relationship between intelligence and the presence of thyroid enlargement has been demonstrated. There is some indication of a tendency for *marked* thyroid enlargement to be associated with lower intelligence but further investigation would be necessary to establish the significance of this relationship.

In considering the study as a whole, it is important to remember its limitations. As it is based upon a limited number of pupils in a single community, the findings cannot be applied more generally without further investigation.

*An Individual Attainment Scale for Clinical Use.* By J. E. W. WALLIN, Miami University.

The development of individual intelligence scales has enabled psychological and psychiatric clinics to secure a scientific rating of fair degree of accuracy of the intelligence level or mental deficient.

But such scales do not afford a measure of educational competency. It is frequently desirable to have such a measure. In order that the educational recommendations and assignment of deficient school cases may be intelligently made, the clinic examiner must know something about the child's educational level. In the absence of a reliable school report, an independent estimate must be made. For this purpose the numerous standardized group attainment tests now available are impracticable. What is needed is a brief composite or omnibus scale (analogous to the Binet scale in the field of intelligence measurement) which will give an approximate measurement of the child's status in a number of significant educational activities. The attainment scale here reported is based upon 22 simple educational tests given at mid-year to 1,066 pupils in grades one to three. The scale contains three oral reading selections, three phonetic spelling lists, five tests in written language, and eleven arithmetic tests, together with directions for their administration and for rating the results. The number of tests in grade one is five, in grade two, ten, and in grade three, seven. A retest of the children in the first three grades and the examination of a number of mentally deficient children have shown the value of the scale as a simple objective measure of the achievement of mental deficient which can be given and scored in about eight minutes.

*Variability Among a Group of Judges in Rating Character Traits in Children.* ADA HART ARLITT, University of Cincinnati, and CONSTANCE E. DOWD, Cincinnati Public Schools.

This study was undertaken to determine whether the variability among judges which has been so characteristic of previously reported studies of individual judgments of character traits, tended to diminish where the judges rating the subjects were trained and where each judge knew each subject intimately. We were also interested to determine the extent to which the "halo" effect was present under the conditions of our experiment.

The subjects were 35 girls living in a summer camp. They ranged in age from seven years to eighteen years. The average chronological age was 13.22 years. The subjects all came from approximately the same social status group.

The judges, nine in number, were, or had been, teachers and had had contact with children previous to the time at which this experiment was conducted. All of the judges except one had had some training in psychology. They had all been in daily contact with all the children for a period of eight weeks before they were asked to

rate them in rank in character traits. Each judge knew each child not only under classroom conditions, but under conditions of relative freedom from restriction, since the judges saw the children during free play periods, at meals, during group games, and in their living quarters. Each judge had each child for periods of instruction in sports or craft. Because of the fact that the judges had seen the children both in classroom and in free periods, they were in a better position to rate the subjects than were most of the judges in experiments reported previous to this time.

The traits in which the children were rated were quickness, perseverance, sense of humor, originality, efficiency, leadership, good sportsmanship, popularity, self confidence, social adaptability, independence and honesty. The judges were also asked to rate the children as to intelligence. The order of merit rating as used by Cattell, Hollingworth, and others was the method of procedure employed in this experiment. The measure of the variability in judgments of individual children in each trait was the total range. The average rating for each child in each trait was also found. Since there were 35 children in the group, the widest possible total range was 34. That total range was reached or approximated in many of the traits with many of the children. For example, one case had a total range of 32 in efficiency, and 33 in independence, and in another the total range in three traits was 30 or over. There was apparently a wide difference as to individual children's standing in single traits and a wide difference as to the degree of the divergence of opinion in individual traits in different children. There was apparently considerably less tendency to variations in judgments as to rank in honesty and popularity than there was to variations in judgment as to rank in good sportsmanship, quickness, self confidence, and originality. There was more tendency to vary in the judgments as to relative rank in intelligence and independence than in any of the other traits.

Intercorrelations were found between the average ranks of individuals in each trait. The formula used was Spearman's rank dif-

$$\text{ference formula } \left( \rho = 1 - \frac{n(n^2-1)}{6 \epsilon d^2} \right).$$

Some of the traits showed high intercorrelations. For example, the correlation between humor and originality was .81, and that between popularity and leadership was .87. There are positive correlations between all of these traits, but these correlations range from .04 to .87. There were a sufficient

number of instances in which the correlations between traits were negligible, to indicate that when trait ratings are based on the average of a group of judges there is not much "halo" effect.

Conclusions drawn from this experiment were: (1) that even trained judges who know the subjects intimately, vary widely in their estimates of character traits in children. This variation may be due (a) to personal likes or dislikes of the judges; (b) to the fact that the traits function in different degrees in different situations; (c) to the fact that judges have different standards as to what constitutes a high standing in each of the traits. (2) Under the conditions of this experiment, finding the rank of each individual in each trait by averaging the judgments of a number of judges appeared to do away in some measure with the "halo" effect, as is indicated by the fact that the correlations between a number of the traits were negligible.

*Some Factors Involved in Judging Personal Characteristics.* Roy M. DORCUS, Johns Hopkins University.

A list of personal characteristics was presented, and individuals were requested to rate themselves as high, low, or average in these traits, and to make a similar rating of a friend of the same sex. The time required for making the rating on each trait was automatically recorded and the data so recorded studied with respect to sex differences, the desirability or undesirability of the traits as judged by the same groups, and the rating of self vs. the rating of others.

*Is Psychology a Biological Science?* ALBERT P. WEISS, Ohio State University.

In his History of Materialism of 1881, Alfred Lange extends the principle of scientific method into human behavior. He says in substance: consciousness can do nothing that is not based in the mechanical conditions of the centripetal and centrifugal nerve conduction and the constitution of the center. The cerebrum acts not as a "soul" but brings about the most complicated combinations of sensation and motion, the effect being analogous to reflex action. Its unity of imagery is an "insoluble mystery." Materialism, more than any other system, keeps to reality—the sum total of the necessary phenomena given to us by the compulsion of sense.

We have here an implied relationship between biology and psychology, but which assigns to psychology the problem of studying an "insoluble mystery" that of imagery. While Lange simply drops imagery out of consideration because it does not fit into the mech-

anistic interpretation (which he regards as the essential condition of scientific investigation) the problem has never been eliminated. It is introduced even into the principles of configurationism, the latest reaction against the predominantly introspective type of psychology. Koffka maintains that "Science cannot refuse to evaluate the factual material that is placed at its disposal" and even though "consciousness excludes the possibility not only of mensuration but also of any true enumeration of the phenomena" he believes that even a non-quantitative description may be of great value in formulating the principle upon which a strictly scientific study of human behavior may be established.

The present writer believes that this statement of the problem is accepted by most of the psychologists in this country. If this is true, then the answer to the question, Is psychology a biological science? depends on how important the so-called conscious processes are held to be. Objects and occurrences that cannot be enumerated and measured can never become the subject matter of science however significant their status in poetry, literature, and the practical affairs of life, may be. However, if the mind-body problem is not regarded as the center of gravity in psychological study, and if we substitute for it the problem "How does the predominantly biological organism that we find the infant to be at birth, become the adult who is able to take his place in the highly complex social activities of modern civilization?" we have a program which conforms to natural scientific methods, provided that language or speech can be shown to be a form of behavior which closes the gap between the achievement of man and that of the nearest infra-human group of organisms.

In speech we have a type of activity which enormously increases the rate of learning new responses to new stimuli, and if speech or language, regarded as a *substitutive* form of stimulation and response, can be reduced to biological elements, then psychology becomes an intermediate science between biology and social science, in which the more rigid natural scientific methods and forms of investigation become part of and may be applied to the educational, vocational, and personal phases of life which have heretofore been regarded as quite beyond the scope of the natural sciences.

*The Teaching of Psychology in Teacher-Training Institutions of the South.* JOSEPH PETERSON, George Peabody College for Teachers.

The object of this study was to determine the qualifications of state institutions giving training for teachers, for teaching psychology.

Letters asking for coöperation and questionnaires on the qualifications of teachers of psychology and on laboratory and library equipment were mailed at about the middle of November to presidents of state normal schools and of teachers colleges and to deans of schools of education in state universities in twelve southern states. Sixty-one letters were sent and twenty-one institutions replied, giving data on thirty-seven instructors. Some replies were incomplete or ambiguous. The institutions replying were divided into two main groups (1) academic colleges and state universities, and (2) normal schools and teachers colleges. A third group, consisting of negro colleges and normal schools, was also considered. The results show a marked difference between groups (1) and (2) as to their equipment for teaching psychology. The normal schools and colleges had practically no laboratory equipment and no funds or plans for equipment. Over half of them had no psychological journals. Less than 6 per cent of their psychology instructors had a doctor's degree, as compared with 67 per cent in the institutions of group (1), and over half of these instructors had not even taken their major training for their degrees in psychology. That is, over half of the psychology instructors in group (2) had not been trained to teach psychology, even to the extent of the requirements for the master's degree. Only one contribution to psychological literature had been made by instructors in group (2), whereas those in group (1) had made fifty-seven contributions, even though there were only three-fourths as many of them. The mean funds for laboratory equipment in group (1) and also the mean number of journals was so large when compared with the similar means in group (2) as to designate these two groups as markedly different. The first evidently regarded psychology as a science which can be taught satisfactorily only by means of laboratory facilities and of journals to keep in touch with the centers of production in psychological research, while the second regarded it as something to be taught theoretically out of a textbook. The study reveals a serious situation in normal schools and teachers colleges. It appears, moreover, that when normal schools become teachers colleges they simply continue with their old unprepared instructors, without getting persons who are properly qualified to develop real departments of psychology. Why should normal schools not have as good work in psychology (pure and educational) as do the institutions in group (1), so far as the college work is concerned?

*Symposium on the First Course in Psychology.* Discussion by L. R. GEISSLER, Randolph-Macon Woman's College.

My conception of the topic of this symposium was that it referred to the problems of method rather than to that of subject-matter. Consequently I emphasized, among other things, the need of using objective methods for testing the students' achievement, for which purpose the completion-test form seems to me most suitable. The time-element in this test may be easily controlled by writing only one sentence on the blackboard at a time. The blanks to be filled out should be numbered, and the answer should require only the writing of the words necessary to complete the sentence.

In discussing the laboratory work accompanying or following the introductory lecture course I exhibited different samples of a set of Psychological Laboratory Leaflets which I have worked out and standardized for my own classes. The object of these leaflets is to reduce the mechanical details for the student to a minimum, to encourage self-observation and accurate accumulation of data, to emphasize mathematical treatment of all numerical data, and to teach how to interpret the results from as many different angles as possible. Other details of handling the elementary laboratory course were also illustrated by reference to the leaflets.

Discussion by HERBERT SANBORN, Vanderbilt University.

The problem of an introductory course in psychology is hardly an isolated question, but is, on the contrary, wrapped up with more general problems of methodology, the aims of education in general, and that of the American college in particular. In view of the present methodological uncertainty in the field of psychology, it seems best, even in an introductory course, to make it clear to the student that we have to do merely with different ways of handling the given subject-matter. Doubtless any method may form the basis of a given presentation of the subject in a first course—which for most students will also be the last one—provided only that the instructor keeps things like this in mind and does not dispose of any of his phenomena by explaining them away. There is probably no room for dogmatism or nostrums in the liberal arts college, if indeed anywhere. The tendency to make the subject of psychology departmental in such an institution is probably a mistake, due to the present state of general disorganization in the curriculum. Probably the whole curriculum needs to be reorganized and unified in accordance with some central-

izing aim, like education for leadership, in which case there should be a modification of all courses in the direction of furnishing an acceptable introduction to philosophical problems. Psychology in Europe has hardly suffered, even in its strictly scientific aspects, from a much closer association with philosophy than has been common in recent years in America; and perhaps psychology in America would have been saved some recent confusion by such an affiliation. In general courses should emphasize methodology, both general and special, and should lead up to theories of mind; since, paralleling a famous dictum, psychologizing—not psychology—is the chief aim of instruction in this subject in the liberal arts college.

Discussion by MAX F. MEYER, University of Missouri.

I define psychology as a branch of biological science; concerned with man more than with other animals; slightly overlapping, on two sides, "biology" in the common departmental sense and "sociology" as nowadays taught in the colleges. I define psychology as a *biological* science picking up those problems which are too much of a *social* character to suit the taste of the other biologists, the zoölogists, physiologists, anatomists, neurologists, etc. In spite of these social leanings of my teaching, I easily keep from duplicating any work of a sociologist by strictly eliminating any problems which have their origin in the history of any nation or in the history of mankind. Custom and institutions, thus, are outside of my field. I make it clear to my students that, while in my psychology teaching I do not concern myself with minds, spirits or souls, I have no fault to find with the belief in souls.

*Aim and Content in the Introductory Laboratory Work in Psychology.* P. F. FINNER, Florida State College for Women.

Psychology is in the stage long passed by older sciences when the method of establishing truth in its field is as important as learning the known facts. We can probably not find courses in chemistry or physics without required laboratory work, but in psychology the omission of experimentation in introductory courses is the rule. If students can gain a mastery of the field without laboratory work, there is small justification for giving it in special courses later. The writer of the paper conceives of experimental work as an integral part of introductory courses; this probably means that single semester courses must be discontinued except for special purposes. The objective in such laboratory work should not be the rediscovery of

the facts of human behavior, although some of this will naturally be the outcome of the work. The principal aim is appreciation of and training in the use of the methods of the science, both as it applies to the discovery of facts and to the establishing of relations between facts. A critical attitude to all statements should be a product of such a course. Learning the use of elaborate apparatus is incidental to the main problem. Statistical treatment of data will be of increased importance, for individual scores have little meaning unless seen as a component in a group score.

*An Experiment in Teaching General Psychology.* JAMES P. PORTER,  
Ohio University.

*Increasing Skill in Foreign Languages.* PANTHA V. HARRELSON,  
Wesleyan College.

*Predicting Scores in Psychology from Certain Intelligence Test Scores.* JOSEPH PETERSON, George Peabody College for Teachers.

*How Should Statistical Centiles be Bunched into Fewer Groups for Such Purposes as Comparing Results of Tests.* MAX F. MEYER,  
University of Missouri.

*Sex Differences.* PAUL BOYNTON, University of Kentucky.

All the Alpha and Terman tests given by the department of psychology to University of Kentucky students during the last five years, 1921-22 to 1925-26, are included in this study. During the year 1921-22 Army Alpha tests were used only with students of the department. During the next year these tests were given freshmen and seniors in Arts and Sciences. The next two years the Terman Group Test of Mental Ability was given to freshmen and seniors in all colleges. This year, 1925-26, Army Alpha was again used, this time with new students of all colleges and students not reached in previous years. A total of 1,170 boys' and 628 girls' scores on Terman were tabulated. A total of 970 boys' and 551 girls' scores on Army Alpha were tabulated. This makes a grand total of 3,295 scores which were tabulated in this study. Total scores on both tests, and scores on four sub-tests of each series were studied. The latter tests were chosen for study in an arbitrary manner, the criterion for selection being that of the interest which it was felt would be attached to the results.

The results show no significant or reliable difference between the total scores of boys and the total scores of girls, on either Terman or Alpha. On the sub-tests studied, Terman 2, 5, and 10 show slight but statistically reliable differences in favor of the boys; and Alpha sub-tests 2 and 8 show slight but statistically reliable differences also favorable to boys. On none of the tests are the absolute differences great enough to be of any practical significance. Only on the pure arithmetic tests, Terman 5 and Alpha 2, are the percentage differences between the scores of the two sexes pronounced. On these arithmetic tests 75 per cent of the boys equal or surpass the median girls' score. The most striking feature of the tables is probably the overlapping of the scores of the two sexes, or the similarity of responses made by the two sexes, rather than the difference in the responses of the two sexes.

*How to Develop an Interest in One's Tasks and Work.* WILLIAM F. BOOK, Indiana University.

This paper gives the results of an experiment tried with three sections of students in Educational Psychology at Indiana University (149 individuals) where this course had recently been made a required course for teachers and where, as a result of this fact, the attitude of the students towards this subject, when taught by the same instructor, had materially changed and where the interest shown in the work by successive groups of students had materially declined after the course had been required of all prospective teachers.

The exact attitude of all these students towards the course was obtained before the work began. A careful study was next made by members of the class of the effect of a learner's attitude towards his work. Experiments were then reviewed which showed what the most favorable attitude towards one's success, towards one's tasks, and towards one's advancement, really is, also how much effect these factors normally produce upon a student's ability to work and succeed. The members of these sections were also given references which explained what had to be done to develop an interest in a particular task or in their work taken as a whole, and this problem was fully illustrated and discussed in class. This changed their attitude completely. They began to apply themselves more consistently and successfully to the early assignments which were carefully worked out so that all could and would succeed with what they were asked to do. The result was a complete change in attitude, a growing interest in

the work of the course which soon raised the attitude and interest of these laggard classes to what it had been in this course two years before when the course was an elective and a delight to teach.

The paper explains what interest really is, illustrates by quotations from the results of numerous experiments, the effect which interest normally has upon one's ability to work, shows how human interests are actually acquired and concludes that college students should be shown by a study of the experimental results bearing on this subject, the effect of acquiring and maintaining a favorable attitude towards their work, towards their success, and towards their own advancement, because these attitudes towards their own advancement help them to do the work they are required to do.

*The Psychology of Freshman Rules.* JOHN E. WINTER, West Virginia University.

This investigation was undertaken in an effort to determine the psychological causes of interclass conflicts which are a perennial problem in many of our universities. The study was confined to those universities and colleges having an enrollment of one thousand or more students.

The objectives outlined in the various sets of rules follow three general lines of thought. The rules are intended to (a) foster school spirit, (b) perpetuate revered traditions, or (c) discipline incoming freshmen.

The rules may be divided into three groups:

Group 1 contains what appear to be innocuous demands upon the freshman.

Group 2 contains strictures which can hardly be considered harmful, and which may prove to be commendable.

Group 3 contains strictures which are positively detrimental either (a) because they are discriminating in character, or (b) because they are objectionable in principle.

The devices commonly used for the enforcement of rules are open to serious criticism. The essence of the devices is alike for practically all—an appeal to physical force, and an evident attempt at intimidation.

Conclusions: All attempts to coerce individuals or groups in an effort to develop college spirit are bound to meet with ultimate failure because they violate a fundamental law of mind. Coercion arouses resistance, not enthusiasm. It is as impossible to compel one to be

enthusiastic as it is to compel him to hate or to love. Enthusiasm is spontaneous. What is needed, therefore, to develop enthusiasm is the creation of an environment that will engender spontaneity.

*Analysis of Spatial Factors Involved in Learning.* Discussion by  
BUFORD JOHNSON, Johns Hopkins University.

A verbal description of Haught's Modified Rational Learning Test was presented to a group of graduate students. After study and discussion of the problem each student was asked to formulate a specific method of solution that seemed best from a rational viewpoint. Later these students, and a group unfamiliar with the problem were given four schedules of this test and the data were analyzed with reference to: (1) The agreement between proposed method and the actual method employed; (2) the spatial factors involved in learning.

In performance both groups failed to make consistent use of the logical method with the first schedule; one of each group succeeded with the other schedules by the rational method. When difficulty arose members of both groups tended to a trial and error method and the previous discussion of methods by one group did not seem a deterrent with regard to logical errors.

Marked tendencies toward localization by means of numbering or of reference to borders of pattern were evident.

The results indicate that a theoretically logical method may not be the most efficient method in a performance which requires speed of reaction when logical errors seem not to be interferences in the early stage of performance.

Spatial factors appear to be more important than heretofore recognized and the method which facilitates the learning of a spatial pattern seems desirable at the expense of committing a logical error.

*A Method of Comparing Emotional Expressiveness of the Muscles Surrounding the Mouth and Those Surrounding the Eyes.*  
KNIGHT DUNLAP, The Johns Hopkins University

Photographs were taken of a number of persons in each of a number of definite emotional conditions. From the prints composites were made so that the lower part of the face of one picture was combined with the upper part of the face from another picture. In this way the expression of the muscles surrounding the eyes in one emotional state could be set over against the expression of the muscles

surrounding the mouth in another emotional state, and the resultant emotional expression judged and compared with those of the two originals.

*The Function of Clothing and Bodily Adornment.* HERBERT SANBORN, Vanderbilt University.

The recent criticism of present styles from pulpit and press, together with the attempts of employers and legislators to regulate the style of woman's dress, presupposes a theory of clothes that is by no means so well established as the reformers themselves assume. A critical consideration of the theories of Westermarck, Schurtz, Wundt, Grosse, and others (together with a review of the anthropological data involved) seems to indicate that many motives coöperated both in the initial assumption and in the later development of clothing; the least probable of these are protection from the weather and natural shame at exposure of the body or even of the pudenda, in so far as these are associated with the sexual function. As a possible motive that may have coöperated with the others, the writer suggests a primitive aversion to hair (such as forms the tacit presupposition of Darwin in his theory of the hairlessness of the human race) and for which there seems to be some further evidence. The motive behind this would be the natural disparagement of a characteristic connecting man with the lower animals and it would doubtless be especially pronounced in races and individuals that should be comparatively hairless. A parallel to this is to be found in the removal of the eye-brows and beard and especially in the coloring and sharpening of the teeth, done, on the testimony of the savages involved, in order to differentiate themselves as sharply as possible from certain lower animals.

*Individualistic Assumptions Underlying Our Theory of Citizenship.*  
SEBA ELDRIDGE, University of Kansas.

Home and community influences develop in the average citizen an uncritical loyalty to the Democratic or Republican Party, where one of those parties is numerically preponderant, or an equally uncritical "independence" in politics, limiting choice at the polls to those parties, where neither of them has a marked preponderance.

The accredited newspapers do little to stimulate a more critical attitude toward political questions, because as a rule they reflect the dominant attitudes of the community at large. Nor do they supply

sufficient information on these questions to enable the citizen to work out well-grounded conclusions of his own with respect to them; moreover, they present a good deal of misinformation relative to questions of this sort.

Political campaigns are for the most part competitions in hoodwinking the electorate, and intensify the partisan loyalties of the voter instead of supplying a corrective for them. The dominant parties have decisive campaigning advantages over minor parties, because of their superior financial and organizational resources.

The public schools do relatively little to counteract these factors, as the political conceptions and attitudes of the teacher are largely moulded by these same influences, and a more critical treatment of public questions would be inhibited by those in control of the schools. Moreover, the student's immaturity and limited period of training do not permit of an adequate preparation for the independent study of political matters.

The result of these influences, positive and negative, is the virtual disfranchisement of the voter, and the domination of politics by the professional politician and the economic interests with which he allies himself.

Our individualistic conception of citizenship is largely responsible for these conditions. We erroneously assume that the voter, given literacy and a rudimentary training in "civics," can discount the powerful influences of propaganda, prejudice and partisan loyalty, and work out sound conclusions on political questions. We thus overestimate the intellectual abilities of the relatively untrained and isolated individual.

The remedy lies in the organization of face-to-face groups for political study and discussion. Only thus can the requisite interest in politics be developed, and a group spirit and solidarity cultivated which shall be sufficiently strong to resist the powerful pressure of family habit, local tradition and uncritical loyalties in political matters. Competent leadership and the problem approach in these discussions are essential.

*Establishing an Independent Criterion in Intelligence Test Construction.* P. F. FINNER, Florida State College for Women.

The validity of an intelligence test is probably most readily established by correlating the scores with an independent criterion of intelligence. The method of assuming the normal distribution of scores,

as is done in the Terman tests, needs to be carefully compared with this. The two should give identical results. For establishing the independent criterion, the facts most generally used are school grades and the numerical estimates of those who know the subjects on whom the test will be standardized. Academic grades taken without making allowance for the standard of the person assigning the grades correlates approximately .60 with known intelligence. By equating the grades of a number of teachers to an equivalent distribution with the same median and variability for all teachers, the significance of the grades as a component in the independent criterion is increased. The second component, that of numerical estimates, can be refined in a number of ways: by requesting ratings only on those subjects who are well known to the person doing the rating; by repeated ratings at intervals of several weeks; by ratings from enough persons to show agreement among themselves. A combination of these two components is proposed as an independent criterion.

*The Effects of Tobacco Smoking on Certain Psycho-Physical Functions.* V. E. FISHER, University of Kentucky.

Three non-smoking male subjects were tested before and after smoking and also on smoking and non-smoking days. The test used was one devised by Knight Dunlap during the war for measuring the effects of insufficient oxygen intake; employed as a test in connection with the aviation corps. The subject was required to tap four keys in response to four corresponding lights which occurred in an ever varying temporal sequence.

All three of the subjects showed a decided increase in efficiency (immediate increase) as a result of smoking, their percentages of increase over the non-smoking scores (records) being 14.6 per cent, 21.2 per cent, and 17.3 per cent, with respect to late responses, and 50 per cent, 24 per cent, and 19 per cent, respectively, relative to wrong responses (striking the wrong key).

A fairly mild brand of cigars was used in this experiment.

## PSYCHOLOGY IN INDUSTRY<sup>1</sup>

BY MORRIS S. VITELES

*University of Pennsylvania*

In April, 1922, Kornhauser (176) published a complete review of the literature on vocational selection. The present review was undertaken with the object of bringing up to date (April, 1926) bibliography on that subject, and to assemble as well the literature on other applications of psychology in industry which has appeared in recent years.

Over a thousand titles were assembled in compiling material for this review. Faced with the impossibility of doing justice to such a great number of titles in the space allotted by the editor, the reviewer decided upon a critical review of selected titles. The selection has been somewhat arbitrary in practically limiting the review to books and to articles devoted specifically to the application of psychology in industry appearing in technical journals. Doubtless a great many worthy publications in the more popular journals have been missed. Moreover, a few in the technical journals have doubtless been side-tracked in the selection process. However, in spite of its limitation, this review of approximately three hundred and fifty titles probably covers the more important material in this field, and furnishes a fairly adequate picture of developments in recent years in the application of psychology in industry.

In general, the review is limited to titles appearing in the last four or five years. In the case of vocational selection a few publications among the earlier important foreign ones omitted by Kornhauser (176) appear in the present review. In the case of other applications of psychology in industry occasional reference is also made to earlier works in order to present a coherent account of developments in the field. A special effort has been made to cover thoroughly foreign literature on the topics of this review. English and German publications have been covered with a fair degree of completeness. There are probably important omissions in the case of

<sup>1</sup> The writer is indebted to Irvin Stander, a student at the University of Pennsylvania, who rendered considerable assistance in the compilation of material for this review.

French publications as a result of difficulty experienced in procuring material from that country.

### VOCATIONAL SELECTION

#### I. GENERAL

A number of major contributions on the applications of psychology in industrial selection have appeared in this country since 1922. Kornhauser and Kingsbury (179) discuss the theory underlying testing and test construction in industry, and describe briefly investigations on the use of tests in selecting workers for office, factory, and related fields. This volume represents the most comprehensive survey of the actual use of tests in business and is particularly helpful in its careful, impartial critique of general procedure and of the findings of individual investigations. Laird (181) devotes a considerable portion of a well-written volume to an evaluation of traditional methods of selection. He gives a few chapters to a discussion of the nature of individual differences, and the remainder to a detailed discussion of the necessary steps to be taken in preparing tests and to an elaboration, admirably suited to the layman as well as to students in psychology, of the statistical methods for the calibration and evaluation of industrial tests. Kitson (151) provides a potpourri of material on vocational adjustment including chapters on job analysis, interest and vocation, psychoanalytic methods, etc., and refers somewhat briefly to testing methods and theory underlying testing technique. Although oriented primarily from the point of view of vocational guidance, this book has a bearing on the selection of workers. There is a tendency on the part of this author to slight the test as an instrument in vocational adjustment. Griffitts (112) devotes a book, designed primarily for students, to the fundamentals of vocational psychology with which the practicing psychologist in industry must be familiar. More stress is laid upon principles and methods than upon application. From this point of view the psychological factors involved in the interview, statistical methods, rating scales, physiognomy and various laboratory tests which have industrial applications are discussed. Although academic in tone and purpose, the content and its organization will undoubtedly make the book of service to the more advanced industrial reader. Hollingworth (126) provides for the general reader a survey of traditional and scientific methods of judging human traits. In content this volume differs little from others mentioned, but it is perhaps less

technical, avoiding altogether the detailed discussion of procedure in vocational measurement.

Among works not dealing exclusively with vocational selection, but carrying significant articles on the history, theory and application of tests is a number of the *Annals* edited by Crennan and Kingsbury (145). Such leading investigators in the field as Paterson, Link, Yoakum, and others have contributed to produce an excellent summary and critique of this important development in applied psychology. A number of articles from this compilation will be referred to below. Snow (293) devotes a few inadequate chapters to psychology in employment. A briefer but more satisfactory summary is to be found in Pintner's (252) excellent treatise on intelligence testing. Lysinski (191) gives a chapter to the problems of vocational selection with particular reference to developments in selecting apprentices for the metal trade and motormen. Likewise, in a compilation by Metcalf (206), Yerkes deals with individual differences and their measurement in business.

Chapters on psychology in vocational selection are to be found in works primarily devoted to broader aspects of personnel relations by Scott and Clothier (288) and Bloomfield (27).

Progress in the use of tests in England is described by Myers (23). The author achieves his object of presenting a simple and somewhat critical account of developments in that country. Underlying theory is touched here and there, but rather briefly. That tests have proven of great value in selection and that the success of their further development is assured are the opinions of the author. A very excellent and complete summary of individual investigations with tests, both American and European, is to be found in a review of the literature on vocational guidance by Muscio (230).

From German presses have appeared a number of major publications on vocational selection. Bünnagel (35) describes developments in vocational testing, with particular reference to investigations on the selection of apprentices in the metal trade. Evaluation procedure is briefly discussed. A considerable portion of the work is devoted to problems of organization, the author contending that research activities in selection on the part of individual industrial establishments often conflict with broader social needs and progress. He recommends, as does Sachs (277), compromise "neutral" institutes for the testing of industrial workers. He favors particularly the centralization of vocational testing in governmental placement bureaus, upon which would devolve the burden of supply-

ing industry with competent workers. Defects in coöperation among research projects in industrial testing are criticized by Sachs (276). Recognizing the impracticability, under present circumstances, of supplanting private by public agencies, she makes a study of existing agencies and outlines a program of guidance and selection designed to protect the social and economic interests both of society and of the individual.

Giese (104) describes a series of tests to be used in the measurement of vocational aptitudes of adults. Although orientated primarily from the point of view of the psychological diagnosis of the individual, the volume contains detailed descriptions and pictures of a great variety of testing material which can be very serviceable to the worker in industry. In addition, there is a wealth of critical reference to investigations with tests which, although somewhat chaotically assembled, can be of great profit. The same ground is covered in greater detail in a later, lengthier volume by the same author (105). A section of a technical manual for the student and worker in industrial psychology by Giese (106) is devoted to a description of testing methods and of material used in industrial investigations. Lipmann (189) contributes an introduction to the problems and literature of vocational selection characterized by the judicious, scientific analysis which is found in so much of his work.

A portion of another German publication by Baumgarten (11) is given over to developments on vocational selection in Russia. Language difficulties and distance have combined to breed an ignorance of developments in that country which Baumgarten's volume can easily dissipate.

More than half of a brochure by Claparède (53) is devoted to descriptions of tests, results of testing and a criticism of method. A brief historical account of industrial testing is also given. The pamphlet is especially valuable as a concise, general introduction to the problems and methods of vocational selection as well as of vocational guidance. The author's plan for a uniform international system of measurement is of some interest. Likewise, the major portion of a larger work by Fontégne (79) is given over to an account of the application of tests in selection in French and other countries. Descriptions of testing material are paralleled by pithy, critical comment.

In addition to these larger contributions the literature, both American and foreign, is dotted with monographs and articles of general interest, *i.e.*, devoted primarily to history, procedure, theory,

and administrative problems rather than to detailed descriptions of individual investigations. Among these are a number dealing primarily with historical accounts of developments in vocational selection. Münsterberg's contribution in this, as well as in other phases of industrial psychology, is treated by Burtt (45). A somewhat biased and altogether incomplete account of vocational selection in American industries is presented by Schlesinger (281) in a German publication. Foreign developments are described by Fryer (99), Miles (209), Myers (234), Viteles (338), and Uyeno (331). A brief description of Russian investigations is furnished by Tagg (312), who concludes that in Russia the welfare of the individual worker is being sacrificed to increased production.

Underlying theory and administrative problems occupy prominent places in a number of articles. Paterson (246) discusses in non-technical terms fundamentals in test construction and evaluation, referring briefly to a few outstanding experiments in vocational testing. Thurstone (319, 323), in a paper of more general interest, discusses fundamental principles in the application of intelligence tests, describing types of examinations with particular reference to the possibilities of intelligence test in the civil service. Link (185) succinctly summarizes the theory underlying testing technique and administrative and research problems, citing in illustration investigations in the selection of factory workers. There is no slighting of difficulties and no hesitation in pointing out the meager accomplishments to date of psychological tests in industry. Suggestive discussion of administrative problems parallels discussion of theory and method.

With regard to administration, Viteles (339) takes issue with the readiness of Freyd (88) and others to place the administration of tests into the hands of untrained examiners incapable of making clinical analyses of test performances. In reply Freyd (94) attacks the clinical viewpoint as unsound and not subject to the objective check essential in scientific research procedure. Criteria as research and administrative problems are discussed by Bingham (21), who makes a plea for adequate records of industrial attainment, as well as in Yoakum's (359) pithy summary of the possibility and limitations in the present use of tests in industry.

Problems in the development of criteria and the need for basic research on the standards of accomplishment are discussed by Viteles (340). Kellner (140) develops and evaluates a formula for weighting time and quality of product (in the metal trade) in a single

criterion of production for use in validating selection tests. Suggestive material along the same lines is to be found in Toops' (324) study of mechanical and clerical ability, Patten's (248) study of the ability to operate a lathe, in Link (185), and in O'Rourke's (242) painstaking analysis of criteria in the development of psychological tests for civil service, as well as in other studies.

A very comprehensive and detailed description of research procedure in vocational selection is provided by Freyd (88) in an article which can well serve as an operating manual for the technical worker in industry.

## II. EXPERIMENTAL STUDIES IN VOCATIONAL SELECTION

(a) *Tests for Skilled and Semi-skilled Workers.* There have been but few publications in this country on the selection of skilled and unskilled factory workers since the appearance of Link's (186) studies in employment psychology, in 1919. In European countries more work has been done with this group, but results are, on the whole, meager and rather less satisfactory than those of investigations in the selection of clerical workers.

A number of recent American publications in this field are critically summarized by Kornhauser and Kingsbury (179), and by Link (185).

Selection of apprentices and workers for machine shops has received some attention. Berry (14) makes use of tests devised by Link (186) in the selection of machine shop apprentices, with a moderate degree of success. Probably the most extensive work along these lines has been done in Germany. Earlier studies by Moede (213), and Lipmann and Stolzenberg (190), have been followed by a number of other original investigations and evaluation studies of old material. Modifications of the apparatus described by Moede (213) in the articles cited above, and in a later, shorter article (212) and used by him in the selection of apprentices for the metal trades, seem to predominate in the German investigations. Description of such tests can be found in the books by Lysinski (191) and Giese (104). A brief statement from each of about twenty-five firms using tests in the selection of apprentices appears in the columns of *Praktische Psychologie* (2).

Friedrich (98) describes a series of tests for the selection of machine shop apprentices for the Krupp works in Essen. Test results are plotted in the form of a profile, and apprentices chosen by an examination of the profile as well as by consideration of the subjective

judgment of the examiner. No evaluation data is cited by the author. Couvé (59) reports on tests for the selection of apprentices that have been given by German railways to 20,000 applicants. The tests, administrative procedure and scoring methods are described in detail, but again there is no indication of what has been done in the way of evaluating this extensive test data in comparison with criteria of accomplishment.

Ruffer (271) describes a study designed to test the reliability of apparatus used by the Osram firm in the selection of apprentices in the electrical industry, as well as of other workers in a plant manufacturing incandescent lamps. The failure to describe in greater detail the makeup of the experimental group detracts considerably from the value of an otherwise intensive analysis of tests, grading, etc. A later evaluation study, using practically the same tests, is reported by Ruffer (272). Following a preliminary analysis demonstrating (to the satisfaction of the author) the unreliability of weekly production as a criterion of efficiency, the investigator reverts to periodic ratings by foremen, a shortening of the training period, etc., as studied over a period of two years, for a demonstration of the value of selection tests.

One of the most satisfactory of the German investigations along similar lines is described by Schneider (282), who compares test results with ratings, production records, and separation records of a great number of women employed in the plant manufacturing incandescent lamps and finds pronounced agreement between test results and productive efficiency. This study is to some extent a development of the earlier one described by Ruffer (271) and referred to above. The use of group methods of testing, making it possible to examine as many as one hundred and fifty applicants with performance tests in the course of a nine-hour day is a notable development. A very excellent experimental analysis of the effects of practice on tests used in the selection of apprentices is reported by Kobis (170), who concludes that on the whole the single examination is satisfactory when a great number of functions are tested.

An evaluation by Hilderbrandt (122) of tests given to machine shop apprentices is weakened by the failure to use more than thirteen subjects as well as by weaknesses in criteria.

Tagg (314) reports in general terms on the program of the National Institute of Industrial Psychology in analyzing the requirements of the engineering (metal) trade, and in selecting candidates for apprenticeship in this trade.

An especially significant experiment is Patten's (248) investigation on testing engine lathe aptitude. Although the subjects are engineering students, the experimental technique, particularly in the development of criteria, represents a distinct contribution towards vocational selection in industry. The tests also represent suggestive material for industrial use.

Closely allied to tests for the machine shop is Heugel's (120) study of the qualifications of blacksmiths and of tests measuring these qualities. A combination of specific ability tests and trade tests are inadequately evaluated on ten subjects.

Arnold (7) gives a series of tests measuring the specific abilities necessary in the carpentry trade to thirty-six carpenters in nine different plants and to children learning the trade in two trade schools. Using as criteria ratings of "good," "fair," and "poor," given by factory managers in the one case, and by teachers in the other, he finds that the tests are decidedly satisfactory for the measurement of potential aptitude for the carpentry trade. It is doubtful, however, whether the combination of subjective ratio from diverse sources and the correlation of test results with a median rank in each of the groups rated as "good," "fair," and "poor," gives a reliable index of the validity of his tests.

Selection for other factory occupations has been subjected to experimental investigation. Muscio (232), in one of the most able of all the studies in this group, finds three tests which correlate high with a proficiency of hand compositors as rated by supervisors. A program for the selection of printing apprentices is outlined by the author. Huth (135) also reports an investigation designed to discover tests useful in the selection of children to be trained in hand composition and printing. The material is carefully analyzed in comparison with available criteria, but the data furnished by the author hardly seems to warrant the high degree of satisfaction with results expressed by him.

Burr (39) reports a possibly somewhat too optimistic account of an extensive try-out and evaluation of tests on workers in six departments of a feather factory. Low correlations between the general intelligence and the efficiency of packers in a chocolate factory is reported by Foster (80) who, in the same investigation, finds that other tests, measuring specific abilities, show significant correlation with the efficiency of these workers. Tests for packers and pipers, tried out on thirty workers in a confectionery factory are described

by Spielman (299), who finds extraordinarily good agreement between test results and ratings by members of the firm.

Investigations have also been made in the dressmaking and textile trade. A detailed analysis of dressmaking ability and tests for dressmaking apprentices tried out on students in a trade school are described by Spielman (300), whose tests, although correlating well with rankings, have low reliability. Abel's (1) analytical study of differences in general intelligence and motor ability in the case of girls capable of receiving training in the skilled trades of dressmaking and millinery, and those incapable of receiving such training, contains much data of interest to the psychological worker in industry.

In the textile industry Wembridge (344) finds that the Scott Dexterity test, used in the selection of textile apprentices, shows no correlation with the productive efficiency of about three hundred workers. A general intelligence test specially devised for the situation shows a fairly favorable agreement with productive records. Outstanding in this study is the comparison of test results with other available methods of selecting employees. An experiment with tests for tapestry weavers is reported by Spielman (298). The author recognizes the need for further corroborating the reliability of tests tried out on only thirteen workers. A rather unusual study, with some bearing on both vocational selection and training, is Binns' (25) investigation of discrimination of wool fabrics by the sense of touch. Differences in the ability of a homogeneous group suggest the desirability of tests in selecting apprentices for training. The importance of training is shown by the higher general level of judgment of experts in the trade. Binns and Burt (26) report a similar, earlier experiment, in which the significance for merchandizing, as well as for selection, of differences in judgment between expert and laymen is suggested.

Tests for the measurement of artistic ability as related to such trades as goldsmithing, etc. are described by Dannenberg (64) and by Bogen (28).

The relationship between general intelligence and trade success was stressed in the analysis of tests used by the United States Army. Although there has been widespread expression of opinion, there are few studies specifically designed to examine the importance of general intelligence in the various trades. Such a study is reported by Cowdery (61). The comparison of instructor's ratings over a period of three years with intelligence tests of over six hundred boys receiv-

ing trade training in a state school leads to the conclusion that, although success in no case is wholly dependent upon it, general intelligence influences trade success. The degree of influence differs in the different trades. The author formulates minimum mental requirements for a number of trades. On the whole, few cases and fairly low correlations are required by the author to bear too great a burden of differentiating mental levels for trade apprenticeship. In this connection, Link's (185) criticism of this method of analysis, and Kornhauser's (177) article on intelligence test ratings of occupational groups are of interest.

Rowntree's (270) discussion of a "mental-motor" ratio, suggesting a name for the concept of a combined intellectual motor ability and its place in industry, may be useful to the worker in industrial psychology.

(b) *Tests for Office Occupations.* Tests for the selection of office workers have received more attention than tests for any other single occupational group. A number of important contributions in this field have appeared in recent years. Many of these are reviewed, in some detail, by Kornhauser and Kingsbury (179), and in a well organized survey of the field by Yoakum and Bills (355). In the former are to be found summaries and critical analyses of such studies as Kornhauser's (173) comparison of mental alertness scores with ability as estimated by supervisors; Snow's (296) findings on the tendency of low score and high score clerks to leave sooner than those with median scores; Bills' (18) study of the relationship between test scores to position and permanency, in which the greater permanency of workers with median scores as well as the fact that mental alertness as a significant factor in success are again indicated.

The above investigations are limited to the evaluation of mental alertness tests in comparison with clerical efficiency. Paterson (244) describes a file clerk test which gives a better indication of specific ability as a file clerk than does a mental alertness score. Other examples of tests of specific abilities of clerks in an auditing department are presented by Viteles (334).

Among other interesting recent studies are Filer and O'Rourke's (75) first experiment in the substitution of new clerical tests of psychological type for the old type civil service examination; Thurstone's (321) compendium and critical comparison of clerical tests used in the civil service and Dück's (66) comparison of test scores with efficiency of clerical workers.

Excellent summaries of recent as well as of earlier studies in the

selection of typists and stenographers and of other classes of office workers are included in the same volume (179). Among later investigations, Burt's (40) study of typists employed in government offices, Muscio and Sowton's (231) comprehensive critical discussion of typist tests and report of an original investigation are reviewed in detail. The check in the latter study by the use of diverse groups, and the resulting analysis of the influence of a specialized group, the nature of criteria, the need for theoretical analysis of occupations, etc., are particularly suggestive. Among other brief but critical summaries are those of studies by Hoke (124) on proficiency in shorthand, by Tuttle (330), and by Kornhauser (174).

Outstanding among more recent studies of tests of clerical ability, not mentioned in Kornhauser and Kingsbury's (179) volume, is Toops' (324) thoroughgoing statistical analysis of sets of tests of general clerical ability devised primarily for the vocational guidance of children. The tests are checked against numerous criteria on numerous groups, and it is finally concluded that the so-called C-1 clerical test is probably nothing more than a good intelligence test which at the same time correlates high with different levels of general business ability. The significance of this, from the point of view of the selection of clerical workers in industry, is apparent, although further investigation of the criteria used in the industrial studies is needed as an additional check upon conclusions. A similarly painstaking analysis of tests of clerical aptitude is reported by Ruggles (274), who concludes that his tests, although simulating closely the work of subjects of the investigation, may also be used in measuring potential ability.

Bieneman (15) reviews earlier studies of clerical tests and describes an original study in the course of which six tests were found to distinguish good from bad typists. The intellectual nature of these tests lead to the rather hasty conclusion that intellectual qualities are more significant of success in typewriting than tests of motor qualities. A more painstaking analysis of the data and more reliable criteria are to be desired. Book (30), on the other hand, making a thoroughgoing analysis of the reactions of five ex-world champion typists, forty-eight contestants in an international typing contest, and sixty-five students at the Indiana University, concludes that although other characteristics are helpful, an unusual degree of voluntary motor control is a necessary factor for attaining the highest levels in typing and for training in typewriting.

O'Rourke's (241, 242) work with mail distributors and postal

clerk carriers in the government service represents an unusual demonstration of scientific technique and scientific standards applied in the employment of personnel and in effecting economy in their selection. Partially standardized tests for junior clerks and supervising clerks are described in Public Personnel Studies. Woodruff (350) describes proficiency tests for stenographers; Poffenberger (263) points out the importance of considering personality traits and the individual tests of the Alpha examination, as well as total score on a general intelligence test, in the selection of a successful secretary.

Bregman (34) reports the results of an investigation in which tests were given to a selected group of clerks and salespeople in a department store. The test proved to be useful in distinguishing between good and poor salespeople as rated by supervisory officers, and between salespeople and clerks. The disagreement between the results of this study in which clerks make better scores on the same tests than salespeople and an earlier study by the same author suggests the need for checking the reliability of these findings on another group. The need for adequate services records for the use of the psychologist are discussed by the author. Viteles (335) describes an investigation involving a follow-up of tests used in the selection of department store cashiers. That a very high score is a disadvantage so far as stability is concerned is suggested by the results of this study. Pruette (264) concludes from a study of over a hundred cashiers that intelligence as measured by a standard test has little direct relation to success, although the chances for success are greater in the middle range. Case studies lead to the further and perhaps hasty conclusion that almost anyone who has a real desire in that line can learn to be a successful cashier. Training and motivation are made the basis of success.

(c) *Tests in the Selection of Transportation Employees.* Considerable experimental work has been done on the selection of motormen. The literature on this subject has been recently reviewed in detail by the writer (336), so that the publications in this field until the middle of 1925 need be merely mentioned here. The survey of the literature referred to above includes accounts of the foreign investigations by Tramm (326, 328), Stern (306), Sachs (278), Kafka (139), Schackwitz (279), Lahy (180), etc., as well as earlier American investigations. Missing from that survey is a study of attention and reaction time of operators of motor equipment by Hallbauer (115). Later accounts of Lahy's experimental work are also to be found in *L'Année Psychologique*, in a well-illustrated

popular article by Dorvain (65), and in articles by Miles (211) and Bacqueyrisse (12). All the accounts of this work are hopeful in tone, but detailed statistical evidence on the reliability of the tests is not made available. This may appear in the book on transportation tests which Lahy is writing.

A description of the most recent and possibly the most extensive American study on tests for motormen is reported by Viteles (337) and Shellow (289). In the opinion of the writer, the careful checking of test results by means of diverse criteria is probably the most important feature of the long-continued investigation described in these two articles.

Snow (295, 297) reports on the development of tests of intelligence and of emotional stability (fear reaction) for taxicab drivers. The tests are fully described and results obtained from the application of these tests furnished. A clearer description of the make-up of the experimental group and of validating technique would have been desirable. Moss (217, 218) measures the reaction time of drivers under operating conditions, and describes a combined written and picture trade test for use in selecting and licensing drivers. The results of the reaction time test are suggestive and may be useful in the selection of drivers, although the technique for its measurement has certain outstanding disadvantages for practical use in industry. Conclusions on the effect of training on reaction time do not seem to follow altogether from the data.

Germany has for some time been using tests in the selection of railroad workers. References to work in this field are found in some of the larger works cited above, e.g., in Fontégne (79), Giese (104). A complete survey of the application of psychology in German railroad operation is contributed by Couvé (60) who, in addition to surveying the selection of train operators, dispatchers, machinists, etc., discusses the economic and social advantages of psychological methods in selection and in training. Schwarze (284) also reviews work in this field.

(d) *Tests for Salesmen, Executives, Engineers, etc.* In a volume intended primarily as a summary of research on selection and training problems of sales personnel, carried on during the years 1916-1924, by the Bureau of Personnel Research, by Kenagy and Yoakum (141), a chapter is given over to a review of the Bureau's work with mental alertness tests in the selection of salesmen. Significant in this connection is the conclusion that the mental alertness test used alone will probably never give high correlation with success in sales production.

However, the possibility of making such tests useful in specific situations, such as in connection with the labor turnover, relative standing of particular sales groups, etc., is noted. The author's insistence, in the discussion of selection tests, upon the importance of handling the problem in each organization, and for each type of sales work, as a unique one is a valuable feature of a careful and critical compilation of valuable material in the field which it covers.

Personality and aptitude tests are reviewed in another chapter including a summary of investigations published elsewhere by Freyd (84), who uses an interest questionnaire as well as a modification of the Downey Will Temperament Test in differentiating between students of salesmanship and students of engineering; and by Moore (215) who makes use of interest and preference questionnaires in distinguishing between sales and design engineers, the value of which is demonstrated in a follow-up study of graduate engineers.

Ream (266) devotes a volume to the ability to sell. The differentiation of "successful," "doubtful," and "unsuccessful," insurance salesmen by means of a modified Will Temperament Test is described in this volume, as well as in an earlier article (267). The greater significance of these tests of temperament over mental alertness tests in the selection of salesmen is stressed by the author. Chapters on the selection of salesmen are found in a volume given over primarily to other aspects of selling, by Snow (294). Freyd (86), in an unpublished paper, describes tests which give a correlation of +0.84 with the success of promotion salesmen as shown by sales records and judgments of assistant sales managers. The method of selecting the subjects of this investigation, variations in test procedure, arbitrary weightings, as well as the small number of cases, combine to detract from the effectiveness of this study.

Specialized studies in the selection of retail salespeople are reported by Bregman (34), Starch (303), and Craig (62), who reports on a preference interest questionnaire which distinguished between good and poor salespeople in one store and failed to do so in another. Gallup (101) finds a better agreement between a graphic rating scale and sales ability (as indicated in ratings by the educational director) than between objective tests with the same criterion.

The scientific selection of competent workers for other semi-professional and professional occupations have been approached in a tentative way. Bills (17), using the Will Temperament Test, tests of intelligence and of social relationships, supplemented by case histories, finds marked differences in personal qualifications between

two successful store managers. This analysis is supplemented by a study of the differences in methods of the managers of these stores. This brief article demonstrates well possibilities in the application of the extensive case or clinical study of individual workers both in the analysis of the factors of importance in job success and in the development of technique for selection and adjustment. Bingham and Davis (24) give a mental alertness examination to a group of one hundred and two business men and find no relationship between the scores on this type of test and business success as estimated from ratings of a personal history blank, although most of the business men are above average in general intelligence. The need for better criteria of business success and of more thorough intelligence examinations, as well as of a further analysis of the individual items of the examination and of the personal history blank is indicated.

The engineering occupations are the subjects of two studies both orientated primarily from the viewpoint of guidance. Burt and Ives (46) conclude from a comparison of test scores with the rather unsatisfactory criteria of instructors' ratings in the case of only forty-two advanced students of agricultural engineering that the weighted test score can be used to state the probability of an individual's attaining any assigned degree of ability in this field. Bramesfeld's (33) study of the engineering profession is more valuable as a review of the German literature bearing upon the use of tests in the measurement of engineering aptitude than as an original contribution in this field.

(e) *Miscellaneous Tests.* There have been, in recent years, a number of studies on the selection of workers for occupations which do not fall readily into any of the groups listed above. The Bureau of Public Personnel Administration has been active in the preparation of tests for occupations as varied as food inspector (224), hospital attendant (222), library assistant (219), bacteriological assistant (227), shift engineer (290), patrolman (317), fire-fighter (318), branch exchange operator (6), pathology assistant (228), janitor (223), painter (226), and prison guard (315). These are published as suggested, partially standardized, and standardized tests, comprising in almost every case a combination of intelligence and trade tests with weightings on experience, physical status, etc. In emphasizing the need for standard material in Civil Service examinations, including tests of native ability as well as of technical knowledge and experience, the publications are no doubt of real value. Moreover, a number of the tests are quite ingenious in character.

However, there is a real danger, in broadcasting these tests, of intensifying the tendency of industry to use and depend upon as reliable and valid, material which has not been submitted to the scientific checks which often convert common-sense material into psychological tools. It is not implied, of course, that the Bureau does not recognize and take steps to combat this danger in connection with its publication of these tests.

As part of the growing recognition of the need for a change in Civil Service examinations, there have been a few investigations on the selection of policemen. Thurstone (320) studies the intelligence of policemen in Detroit and Cleveland using the Army Alpha. He finds that this test is not particularly helpful in selection. The inverse relationship between test scores and length of service suggests to the author that the more highly intelligent men seek jobs better than that of policeman. In a later article he reports an analysis of old type civil service tests used in the selection of policemen in Philadelphia, showing the greater predictive value of the tests at the higher end and the varying reliability of the individual tests. Training School records serve as criteria. Martin (196, 197) also reports on the use of tests for the same purpose. Ostrander (243) gave a neurological examination, complemented by Binet and supplementary tests, to a group of 150 probationary policemen who were also subjected to an intensive interview. The follow-up at the end of the year showed little agreement between intelligence and stability of personality and success on the police force as indicated by officers' ratings. The construction of a clinical picture of each subject is a significant feature of this investigation.

Experiments on the selection of telephone operators extending over a number of years and covering about a hundred subjects in three cities are described by Giese (103). About twenty tests, some of them involving complicated apparatus, were used in the course of this long extended investigation. At the end, the author expresses himself as hardly satisfied with the results, largely because of difficulties in developing satisfactory criteria, although the superior reliability of the test results over the subjective judgments of supervisors is noted. The study is outstanding among German publications in its frank recognition of the limitation of psychological technique in selection. Included in this report is a detailed analysis of telephone operation, of the effect of conditions of work, as well as a study of ratings by supervisors. An interesting critique of the work of Klutke (168,

169) in the same field forms part of this study. A section devoted to the application of the Fernald and other tests of ethical and moral traits is of some interest. In the same monograph is discussed an investigation on the use of tests in the selection of telegraphers. One of the articles by Klutke (168) referred to above includes pictures of apparatus for the measurement of reaction time, attention, etc., used in connection with experiments in the selection of long distance telegraph operators, as well as a detailed discussion of procedure.

Other miscellaneous studies include an extensive experiment with hairdressers by Schulte (283). Freyd (89) makes use of a group of students of journalism and of a few reporters in evaluating a set of ingenious tests of journalistic aptitude.

Although not directly evaluated in industry, Stenquist's (305) description of his tests for the measurement of mechanical ability, the evaluation of the same test, and the description of tests for the measurement of the mechanical ability of girls in a work by Toops (324), cited elsewhere, as well as Garfiel's (102) study on the measurement of motor ability, may be of interest to the worker in industry. This is also true of the description by Moss (221) of tests of the ability to get along with people.

(f) *Trade Tests and Rating Scales.* The trade test as a measure of vocational fitness has received only scant attention in recent years. Publications specifically devoted to this subject are few in number and these few are almost exclusively confined to descriptions of developments during the hey-day of war and post-war activities. Accounts of original investigations of more recent date are limited to one or two of no great importance. Chapman's text (51), published in 1921, still remains the standard work in this field. The material on method, etc., in this book is summarized succinctly in a later, shorter article by the same author (50). The statistical method employed in the construction of Army trade tests is critically reviewed by Kornhauser (175). The significance of trade tests and trade test technique in education is the burden of a monograph by Toops (325).

Tests which are primarily measures of efficiency rather than of aptitude have been used in investigations designed to measure vocational aptitude. Reference to such tests are found in the review of the literature on tests above. Williams and Knapp (345) describe two scales (akin to trade tests) for measuring the efficiency of

machine sewing of pupils in elementary schools. Subjective judgment plays perhaps too great a part in grading, but the material and technique of this study are suggestive for industrial purposes.

Rating scales have not been neglected to the same extent as trade tests, but here too the number of titles are few. In this connection, the reviewer suspects that the number of articles gives no real indication of the extent to which this instrument is being used by industry. Chapters on rating scales are found in the volumes by Kitson (151), Griffitts (112), Laird (181), etc. Paterson (247) submits a list of twelve principles governing rating scale construction and use, and, in a discussion of these principles, provides a pithy critical summary of the important factors affecting the validity and reliability of these instruments, as well as descriptions of types of rating scales.

Rugg (273), in an extensive study, demonstrates the unreliability in practice of the man-to-man comparison as a method of rating and suggests that such methods of rating be discarded and attention better be given to devising more objective means of measurement. The superior reliability of the graphic rating scale is revealed by Paterson (245) in a convincing article describing a well organized investigation for testing the reliability of this method of rating human qualities. Threading his way with nicety between the Scylla and Charybdis of theoretical research and the insistent demands in practice for scientific compromise, he outlines procedure for safeguarding against the inherent imperfections of rating procedure, noting the importance of statistical treatment to counteract the tendency toward too high or too low ratings by individual supervisors.

Kingsbury (144), while recognizing the inherent unreliability of rating scales, takes issue with Rugg and advocates their extensive use as more objective methods than those in vogue in industry for measuring qualities and abilities upon which judgment must be rendered. Careful analysis of ratings and the training of raters are emphasized as factors which, in addition to scale and technique, can be handled in a way to increase the reliability of ratings. The dependence upon scales as useful tools is emphasized in another article by the same author (146), in which is stressed the need for adjusting the rating scale to the particular situation instead of adhering to what is incorrectly conceived as the one best method, the justification in sacrificing refined statistical methods for practical purposes, and similar viewpoints reflecting the philosophy of the practical technician. The same point of view is developed in another

report (143) on the application of rating scales in a large bank, in which administrative procedure is described in detail and underlying principles discussed. There is supporting evidence for the rating scale as a step forward in providing objective measures of mental traits in Gallup's (101) study of the traits of successful salespeople and in the laboratory investigation by Landis (183). Freyd (85) contributes a general article on graphic rating scales and a description of a graphic rating scale for teachers (87). Hepner (119) reports on the use of a check list of traits to complement a graphic rating scale.

(g) *Non-Test Factors in Selection.* The use of methods other than that of the psychological test in the selection of workers is discussed in a number of recent publications. Poffenberger (260) discusses the place in selection of photographs, the interview, letters of application in a critical review of usual employment methods in which evidence from experimental studies is cited. A particularly suggestive study of the value of underwriting and photographs in estimating intelligence is reported by Omwake (240).

Dunlap (67) turns the full force of his critical acumen upon the validity of well known systems of character analysis based upon an examination of physical make-up. Experimental evidence on the unreliability of such methods is supplied by Cleeton and Knight (54), and by Snow (292).

The possible importance of factors other than mental ability, as measured by psychological tests, in selecting workers, has been experimentally investigated in recent studies. Many of these are summarized in the books by Laird (181), Kitson (151), etc., mentioned elsewhere in this review.

Goldsmith (111), in a study of personal history blanks of 502 life insurance salesmen, finds a positive relation between data on these blanks and future success. The scoring of the items on this blank and the development of a critical score making possible the elimination of undesirable applicants for employment are discussed. Another extensive study of the personal characteristics of salesmen is reported by Johnson (137), whose composite verbal picture of the ideal applicant includes all of the personal characteristics found to distinguish successful from unsuccessful salesmen. The positive character of the relationship between personal characteristics revealed by an analysis of application blank data and success in selling is further demonstrated in a report of a comprehensive study of 4,000 life

insurance salesmen by Manson (193) and in another unpublished report (194) by the same author.

A very thorough study of relationships between such personal characteristics as age, marital status, amount of insurance, etc., of salesmen and success on the job is reported by Russell and Cope (275). The scoring of each of these factors makes possible the prediction of success in selling insurance. A follow-up study demonstrates the reliability of this simple, yet adequate method of scoring these non-test factors.

A brief but interesting report of similar findings in the case of salesmen is supplied by Swartz (310). Kitson reports a number of shorter studies along these lines. Figures on 600 specialty salesmen (148) show that height and weight are negligible factors in selling, although he finds that the average height of salesmen is about two inches above that of a non-selected group, as do Kenagy (142) and Manson (193).

The literature on this topic in the case of salesmen is very adequately summarized in the volumes by Strong (309) and by Kenagy and Yoakum (141).

Kitson and Donham (150) construct a picture of the personality of metal workers by analyzing the application blanks of 400 applicants for employment, not all of whom are employed. The data is not correlated with accomplishments, so that it is difficult to know just what value it has in vocational selection. Kitson (158) reports a similar statistical study of office workers. Bills (16), in a study including perhaps too few cases, finds an indirect relationship between the stability of clerks and the social status of parents. Kornhauser (174), in his study of bookkeeping machine operators, finds, among other things, that the number of years of schooling agrees as well as test scores with efficiency records.

In addition to the instability of employees under twenty-five years of age, Kitson (139) discovers that forty-one to fifty years of age are also critical years in labor turnover, that is, that men of these ages hold the job for a shorter period of time than do younger and older men. The findings of this study are based on an investigation of the ages of 2,500 workers in four plants.

Perhaps the most thoroughgoing statistical analysis of non-test factors, by means of a partial and multiple correlation, in the case of 200 individuals and in each of the occupations of clerk, salesmen, accountant, engineer, is reported in an unpublished doctorate thesis by Cawl (49).

(h) *Analysis of Occupational Qualifications.* The place of job analysis in vocational selection is discussed in practically all of the longer contributions on psychology in vocational selection cited above. The scarcity of shorter articles specifically devoted to this type of activity suggests a flagging interest in this field.

It is impracticable to discuss here such differences in point of view as, for example, Kornhauser and Kingsbury's (179) feeling of the general ineffectiveness of job analysis, and Kitson's (151) brief for this method as a factor in vocational adjustment in a chapter devoted to a detailed discussion of the methods and contributions of job analysis. This review must be limited to a brief reference to a number of shorter articles in this field appearing in recent years.

Meine (204), in a well written critical article, discusses the general methods and procedure of job analysis with particular reference to what psychology has contributed in the way of emphasis and technique. There is an emphasis on the quantitative statement of job demands that is in place. Kitson's (163) contention that the job should be analyzed in terms of itself, that is, in terms of its tasks, is in contrast with the analysis in terms of mental qualities described by Viteles (334, 342), although both agree on the need for the description of qualifications in quantitative terms.

An outstanding application of the task method of study is found in Charters and Whitley's (52) analysis of secretarial duties and traits, and a monograph on the printing trade by Strong and Uhrbrock (308). These are perhaps the most careful pieces of work in the field of job analysis that have appeared to date. A bibliography of ninety titles on job analysis is included in the latter monograph. Analysis of the type followed by Viteles (334) are reported by Cades (47) in the case of the printing trade, and by Wood (349) in the textile industry. A similar but more detailed analysis covering the various operations in the machine shop is provided by Friedrich (97), who, however, divides necessary qualifications into only two groups, those which are highly necessary and those which are mildly so. Fischer (76) includes in his book a rather superficial and not very serviceable survey of the qualifications of the patent engineer.

Ikin (136) questions managers on qualities desirable in the foreman and reviews a list of qualifications, not stated in quantitative terms, of highly doubtful validity. Tagg (313) follows the same method in the engineering (metal) trades. However, the latter defines concepts and makes use of quantitative ratings.

Baumgarten (9) reports an analysis of the duties, methods, training, causes of failure, reasons for entering the vocation, and mental qualifications of insurance agents, based upon an interview of seventy workers, the results of thirty-nine of which are finally subjected to analysis. The highly subjective material of this analysis contributes little, if anything, to more reliable selection. Combined with other objective data, the clinical data obtained in the course of such interviews might be of service in the vocational adjustment of workers on the job. A similar analysis of the occupation of claims agent is presented by the same author (10).

Bramesfeld (33), writing as an engineer, contributes an analysis of his own profession, reviewing in detail contributions in this direction by other workers. The author's analysis is largely based on a questionnaire answered by twelve professors in a technical high school, and is summarized in an elaborate and none too clear statement of the qualifications for various branches of the engineering profession.

A description of the organization of an occupational survey, in the course of which are developed job descriptions, is furnished by Clothier (55) and by Bills (19).

(i) *Bibliographical.* No comprehensive summary of the literature on tests has appeared since the publication of the critical review by Kornhauser (176). A very comprehensive, uncritical bibliography on psychological tests and other objective measures, very satisfactorily arranged under topic headings, has recently been published by Manson (192). Lipmann's (187) bibliography, Claparède (53) and Muscio's (230) critical summary stand out as very useful aids to workers in the field. From time to time Lipmann has published in the *Zeitschrift für Angewandte Psychologie* abstracts and critiques of current literature on vocational testing as well as on other phases of industrial psychology. In *L'Année Psychologique* important articles appearing in French and other journals are summarized.

#### APPLICATION OF PSYCHOLOGY IN MERCHANTISING

Recent years have been marked by a development of interest in the correlation of the principles underlying human behavior with merchandising activities. In the case of salesmen and advertising managers the increased interest has largely taken the form of the acquisition of a supply of psychological jargon which little affects merchandising activities and still less reveals factors affecting the buying or selling situation. In the case of psychologists the interest

has taken two directions:—(1) an attempt to rationalize accepted principles of human conduct as revealed by laboratory investigations in pure science in terms of the specialized performances described as buying, selling, or advertising; and (2) an attempt to set up experimental conditions, that is, to apply scientific technique in investigating the factors influencing these forms of human response.

Among works appearing within recent years, Kitson's (161) volume is a fair example of the first tendency. That is not to say that the book is entirely devoid of references to experimental work, but its outstanding feature is the bare statement of general laws of behavior growing out of laboratory experiments and the interesting, if not always reasonable, illustration of these in the selling process. Probably the best recent example of the second tendency is Poffenberger's (261) excellent study of the application of psychological methods in the investigation of advertising problems. The emphasis throughout is on experimental data and its appropriateness for specific purposes, rather than on the general philosophical implications, for advertising, of psychological principles. There is noticeable reserve in the application of experimental findings. A number of shorter articles bearing on this subject are reviewed in this text. Starch (301), in a thoroughgoing analysis of the fundamental problems of advertising, devotes considerable space to psychological factors. The psychological laboratory and psychological experiments outside of the laboratory are called upon for demonstration of principles underlying advertising activities. Much emphasis is placed on the scientific attitude and upon scientific technique in the investigation of advertising problems. However, a considerable part of the volume is devoted to administrative aspects of advertising, to historical details and economic problems which, although of prime importance to the business man, are only of indirect interest to the research worker. There is a wealth of illustrative material. As a matter of fact, the reviewer wonders whether or not, even for the business man, there is a crowding up of material in a way which detracts from the usefulness of the book. Lysinski (191) devotes about half his book to the review of American and German investigations on color, form, position, etc., in advertising, and develops in quite moderate terms the possibilities of the scientific approach in making advertising more effective. Friedlander (95) discusses the application of what is known about attention, memory, instinct, etc., in the advertising program, illustrating with reproductions of advertisements (mostly American) and citing experimental evidence.

here and there. The author's apology in his introduction, that the work makes no claim for real merit in the field of scientific psychology, is in place.

Strong (309) offers what he describes as a psychology text outlining the basic factors involved in influencing others. The two tendencies described above are combined in this volume. Experimental evidence is occasionally cited, but the tendency is not so much to depend upon scientific findings, which are limited, as more or less arbitrarily to associate selling and advertising technique with laws of human behavior. There is a tone of certainty about the book which strikes the academic reader as somewhat out of place in this field. Under a somewhat misleading title, Snow (293) offers an only partly digested mass of material and a series of generalizations on selling and advertising sprinkled with references to underlying psychological principles. There is practically no citation of experimental evidence. In a later volume (294), devoted exclusively to the psychological approach in the field of personal selling, he proposes to write a psychology of personal selling without recourse to the theory of instincts. As a matter of fact, the substitution of wants and desires (following Dunlap) for the affective element of instinct makes very little change in the psychological approach. However, this volume is a considerable improvement over the first book. There is more frequent citation of experimental evidence and of other authorities and a much more careful analysis of material. In this volume, as well as in the one by Poffenberger mentioned above, there is an extensive bibliography.

The journals furnished a number of shorter general articles on the application of psychology in merchandising. Experimental studies in selling are fewer than in advertising. There seems to be a real need for more experimental investigations in the former field.

Kitson (153), in a well written article, points out that the consumer undergoes psychological changes in attention, interest, etc., in making a purchase, and that the psychological approach must be used in the investigation of these changes. He shows the need for the substitution of newer lines of research for the primitive methods of early investigators, and the importance of conducting investigations on the consumer when he is buying instead of depending upon information from laboratory experiments on subjects who, for the moment, are not consumers. Starch (302) analyzes the chief sources of waste in advertising, research methods in testing, advertising effectiveness, *i.e.*, attention value, layout, position, text, etc., and

discusses the general desirability of such research. In another article (304) he describes in greater detail methods used in testing advertisements, and gives examples of experimental evidence on the possibility of better measuring the relative value of advertisements as a whole, and the various elements of such advertisements. The importance of using as subjects a group typical of the consumers is also emphasized by Starch.

Pear (250) discusses in moderate terms the possible applications of the experimental methods of psychology to the problems of advertising, recognizing, however, the possible superiority of the so-called "instinctive advertiser in problems with reference to which the youthful science of psychology has no adequate experimental evidence." The importance of considering psychological factors in window displaying is discussed briefly by Piorkowski (256). Bartlett (8) reviews the importance of such factors as range of apprehension, reproduction, focal, and imaginal attention, etc., in advertising, and describes laboratory investigations made by the N.I.I.P. on English newspaper and magazine advertising.

Stevenson (307) learns heavily on Kitson (*Annals*) in describing the psychological processes of instinct, attention, etc., underlying the salesman's approach to customers, as illustrated in sales incidents, in another example of the tendency in this field to depend upon conjecture rather than upon experimental analysis. In contrast to this author's discussion of appeals to instinct and intellect is Poffenberger's (258) description of experimental investigations of conditions of belief in advertising leading to the conclusion that (1) advertising statements must not conflict too sharply with reader's experience; (2) they must suggest authoritative sources; (3) that the reader tends to believe that which arouses desire, fear, etc. Similarly suggestive are his findings (262) on the comprehension of advertisement from experiments in which consumers are used as subjects, and Laird's (182) study of motives in the consumer's purchase of toothpaste. A number of other interesting and significant experimental studies have appeared. Burtt and Dobell (43) report a study on the curve of forgetting with material designed to reproduce a kind of association frequently involved in advertising procedure. The similarity of the curve of forgetting in this study to that of other studies, with other material, as well as the advantages of early over later follow-up procedure, are noted. The experiment justifies the conclusion of the superiority of earlier follow-up procedure made by Kitson (161) on the basis of theoretical experiments.

Holmes (128) describes an experiment showing the advantage of the free over the controlled association method in testing the strength of association between firm name and product. Laboratory experiments on pictures in advertising are reported by Burtt, Clark, and others. The former (128) describes a suggestive experiment showing that when the facial expression of satisfaction is a selling point in an advertisement, the optimum amount depends upon the kind of commodity advertised, and that it is not always desirable to show pictures showing utmost satisfaction. Nixon (239) finds that pictures of people are much more effective attention devices in advertising than color. In comparing color with white and black, unlike Kitson (154), he questions whether, considering the extra cost, the excessive use of color as an attention device is warranted. The former is supported by Freyd's (92) conclusion from a sound analysis of keyed returns that it costs twice as much to get a certain number of returns by the use of color pages than by the use of half pages of black and white. Freyd's results suggest the inadvisability of Kitson's assumption, in recommending the historical method (156), that the increased use of a medium is a sign that it has been profitable. There may be here another demonstration of Pear's (250) axiom that psychology, far from being a science which states obvious things in technical terms, sometimes discovers that obvious things are not true. A small volume by Kitson (157) is given over to a discussion of this historical method and to reprints of investigations cited here. Although there is greater reserve shown in the claims made for the historical method, the importance of this method as a psychological technique is still overemphasized.

Applying the historical method, Kitson (155) finds that wash drawings and photographs are replacing pen and ink illustrations. He interprets these in terms of evaluation of art forms in advertising, neglecting to note the influence of progress in mechanical processes of reproduction.

Changes in headlines over a period of twenty years are noted by Warden, Rorison, and Solinger (343). Kitson and Morgan (152) find a definite ratio between headline type and dimensions of advertisements in two periodicals. In this connection Burtt and Basch's (44) laboratory study of the legibility of various type faces is interesting. Poffenberger and Franken (264) find that facial types have characteristic atmosphere, that is, give rise to varying feelings of appropriateness which should be considered in the advertisement of given products. From a very suggestive preliminary study with fifteen subjects, Jones (138) concludes that the affective

and memory value of different letters and syllable forms can be experimentally studied to the advantage of applied psychology (in advertising). Definite trends indicating relationship between affective qualities and syllable forms, and lesser relationships in the case of memory value, are noted. Kitson and Campbell (166) infer from the increased use of the package in magazine advertising that this will be a valuable feature in advertising appeal.

Franken (82) makes use of the method of direct impression as a substitute for the order of merit method in measuring the strength of appeal of various statements of hosiery advertisements. Discounting, with the author, the fact that students instead of consumers were subjects, the results and methods of this study seem highly valid. An ingenious study on the effectiveness of advertising is reported by Piorkowski (257), who makes newspaper readers his subjects in a prize contest in which they fill in questionnaires on their reactions to advertisements appearing in the newspaper for a period of eight days.

An experimental study of confusion between trade names is described by Burtt (42). Its significance lies not only in the results but in the applicability of the technique in objectively measuring degree of confusion for purposes of legal evidence in case of trade name infringement. Piorkowski (255) employs psychological equipment and technique in selecting the most desirable trademark for a new motion picture apparatus manufactured by a German firm. An unusual and interesting application of psychological methods in the evaluation of accident prevention posters is described by Frank (81). A study of the testimonial as an advertising appeal is reported by Turner (329).

Snow (291) outlines the curriculum of an advanced course in experimental psychology as applied to advertising. In *Industrielle Psychotechnik* appears a fairly comprehensive review by Hahn (114) of recent American publications on psychology in advertising.

The word psychology is used frequently perhaps with the purpose of polishing or toning up a lot of common sense advice on selling in a volume by Swift (311). Although it is not primarily psychology, the volume makes exceedingly interesting reading. Chapters on leadership and management are included.

#### OTHER INDUSTRIAL APPLICATIONS

The application of psychology in industry in this country has been practically limited to vocational selection and merchandizing, although that the possibilities for more extended research are recog-

nized, in some quarters at least, are suggested by Person's (251) statement on the present status and problems of industrial psychology; by Yoakum's (358) most stimulating paper on experimental methods in personnel problems, and by the article by Bingham (21) referred to elsewhere. There are only occasional contributions in training, in measuring industrial fatigue, in determining best conditions of work, etc. On the whole, the latter applications have been looked upon as in the field of the efficiency engineer. Encroachment upon this field has been frowned upon both by efficiency engineers and by psychologists. It therefore happens that in a review of the present state of industrial psychology Gilbreth (109) is able to refer in a sentence or two to accomplishments in motion study, the effect of conditions of work, etc., as contributions of "specialized bodies." This condition explains the brief reference to such important factors as fatigue, illumination, amount of sleep, etc., in a well written discussion by Robinson (268), of experimental methods of studying efficiency and factors affecting it.

Foreign psychologists, on the other hand, look upon business functions as a series of human reactions, man upon man, man upon machine, upon material, etc., and concern themselves with all factors which may influence the efficiency of man in industry. Foreign technical journals are well filled with experimental studies, in factory and laboratory, by psychologists, of the manifold factors affecting human efficiency in industry. The European point of view on the scope of industrial psychology is elaborated in articles outlining the responsibility of psychology in the field of motion study, the layout of equipment measurement of industrial fatigue, study of incentives, etc., by Witt (347), Farmer (71), and Cullis (63); in a brief statement of the history of the National Institute of Industrial Psychology (3), a monograph on the scope of industrial psychology sprinkled with references to the literature by Lipmann (189), and is critically discussed by Viteles (338).

The point of view is perhaps best expressed in an article by Myers (236), who describes the efficiency engineers as prone to regard human workers as machines, and expresses the belief that only the psychologist, by virtue of training and background, is in a position adequately to weight the emotional and intellectual factors influencing efficiency in industry. The insistence upon the One Best Way of working and the use of excessive refinement in time measurement are likewise adversely criticized. The contrast between the older point of view of the engineer, looking upon workers as

machines, from the standpoint of greater output, and the psychologists, interested primarily in the welfare of the workers, is further stressed in a later article by the same author (235). The Gilbreths (107) reply to Myers in an article outlining a liberal interpretation of the One Best Way and defending their use of extremely small units in time measurement. The relationship between psychologist and engineer is discussed, and the opinion expressed that psychology will progress faster in industry through the coöperation of, and usually under the direction of, the industrial engineer. Their point of view is further developed in a later article (108).

As indicated above, the broader range of activities of European psychologists interested in industrial applications is naturally reflected in the literature. The major portion of Myers' (237) book is given over to a description of the work of the National Institute in investigating conditions and methods of work. In the same manner, the volumes mentioned elsewhere by Lysinski (191), Giese (106), etc., are devoted, in considerable part, to a description of studies of the same sort. Tramm, whose work on the standardization of tests for the selection of motormen has been referred to above, contributes a discussion (327a) on the relation between psychotechnics and the Taylor system and a description of numerous investigations on time and motion study, conditions of work, fatigue, etc. Harrison (116) contributes a readable volume for the layman on the application of fatigue study, investigation of incentives, conditions of work, etc., in facilitating production in industry.

The catholicity of interests of foreign psychologists is further revealed in shorter articles on conditions of work such as those on the length of the working day, by Lipmann (188); on rest pauses, by Farmer and Bevington (70), Miles (207), Hirsch (123), and others; in studies on methods of work, such as Farmer, Adams, and Stephenson's (73) very significant study of coal mining; the excellent study on differences in weaving by Elton (69), and other specialized studies on motion study, the influence of atmospheric conditions, avoiding of breakages, etc.

In spite of the general interest of the psychologist in these investigations, and the reviewer's personal sympathy with the European point of view on the scope of industrial psychology, no attempt will be made, by reason of limitations of time and space, critically to review such studies in this paper. The reader interested in such studies is referred to the publications of the Industrial Fatigue Research Board, whose work is summarized in a series of annual

reports (129, 130, 131, 132, 134), the *Schriften zu Psychologie der Berufseignung und de Wirtschaftsleben*, and to the foreign technical journals. Excellent summaries of current research along these lines are published and reviewed in the *Journal of the National Institute of Industrial Psychology*, the *Journal of Personnel Research*, *Industrielle Psychotechnik*, and in *Industrial Psychology*. However, a number of contributions on the application of psychology in accident prevention, analysis of motives, and similar topics of more general psychological interest, have been selected for review below.

The *industrial accident* as a psychological problem is considered in a number of recent publications. Perhaps chief, or at least the longest among these is a volume by Fisher (77), who manages to weave a good deal of sound psychology and valuable suggestions on the psychological backgrounds of safety into a network of illustrative material from factory and street. There is much oversimplification of psychological principles, and many false implications, but these are without doubt counterbalanced by the original and ingenious application of the psychology of habit formation, attention interest, etc., to the problems of safety and by the extent to which this volume may stimulate thought on the part of laymen and psychologists alike.

Moede (214), in a sketchy article, reviews the factors in accident causation and points out the place of a statistical analysis in determining causes of accidents. The effect of machine construction, the scientific selection and training of workers, etc., in accident prevention, are discussed. The need for the evaluation of accident prevention posters is suggested in this article and discussed at length by Frank (81) in a report embodying the findings of an experimental analysis of the effect of posters on different groups of workers. Couvé (57), making a careful analysis of the cause of railroad accidents, judiciously outlines the responsibility of medical examination, of the measurement of vocational aptitude, of the care of mechanical equipment, etc., in accident prevention on railroads.

The importance of the personal equation in accident prevention in mining is suggested by Read (265), who, however, makes no recommendations on how to meet this problem. Marbe (195) demonstrates the importance of the personal equation by figures showing that individuals suffering accidents are more likely to be involved in accidents in succeeding years than those who have never incurred such misfortunes. The importance of this in connection with the selection of workers is discussed. Heller (121) discusses vocational selection in relation to accident prevention. An account of a psycho-

technical study of factors involved in two railroad accidents is reported by Couvé (56).

The literature on industrial accidents, including that on psychical influences in accident causation, the effect of drugs, etc., are reviewed in a publication by the Industrial Fatigue Research Board (133). That rate of work and not fatigue is a principal factor in hourly variations in the number of industrial accidents is suggested by an inconclusive laboratory experiment involving six subjects on aiming and pendulum tests (133).

That new employees, possibly by reason of unfamiliarity with the job and because of nervousness, are more prone to have accidents is shown in a study of 30,000 accidents by Kitson and Campbell (165).

Technical and popular articles both in the field of psychology and that of economics have been filled with statements on the *motives* animating industrial workers. However, factors responsible for the behavior of workers in industry, their readiness or unreadiness to work under given conditions, the effect of changing conditions on motivation, etc., have not been submitted to experimental investigation to any great extent, largely because of the conditions involved in developing a satisfactory experimental technique. The importance of making observed facts the basis of generalization concerning motives is the thesis of a criticism by Kornhauser (178) of the subjective approach of this subject. Instincts, desires, unconscious purposes, are described as flowering verbiage which serve merely to conceal the real problem. A plea is made the substitution of the study of such observed factors as age, nationality, the effect of changes in employment procedure, a detailed study of feeling and attitude of employees in a comparison of different groups in different plants, in determining the causes and motives underlying changes in activity. As a theoretical approach the procedure doubtless has an advantage over the armchair ratiocinations of the defenders of the instinct and of the subconscious as motives, but the rôle of interpretation in determining whether a causal relation between a complex of factors and activity is demonstrated still looms large in even this factual approach. The problem of interpretation and the rôle of subjective analysis are well exemplified in the work of Mayo (198, 199, 201), who makes pessimistic reverie bear the burden of individual and group maladjustments which could as readily be described in terms of fatigue, hours of work, wages, inadequate rest pauses, and other more objective factors of the sort with which Kornhauser would deal in his search for causes underlying workers' activities.

Kitson likewise insists upon the need for defining incentives or motives for production objectively and measuring their effects quantitatively in articles (159, 162) demonstrating the increased output of workers under a particular wage incentive. However, in explaining a drop in output after the twentieth week the author reverts to a decidedly subjective terminology. Many influences and types of motives in production not experimentally investigated are suggested in a report of an English conference on hindrances to output (4). Financial and nonfinancial incentives are discussed in very general terms by Farmer (72), who recommends a joint study of this and similar problems by psychologists and economists. Interest as a factor in industrial dissatisfaction is the subject of a suggestive article by Fryer (100).

The influence of *monotony* on the efficiency and well-being of workers in industry is closely related to that of motives, although the experimental approach to their study probably presents fewer difficulties. The problem is outlined in an article by Wyatt (353), who also describes a number of industrial investigations designed for measuring the effect of monotony and the results of experimental changes in activity, introduction of rest pauses, etc. Although probably too much given to generalization, the paper serves as a brief introduction to this complex problem. Among shorter experimental studies are Burnett's (36) well planned investigation of the behavior of subjects of different intelligence on repetitive work, in which the lesser aptitude of the more intelligent subjects is noted; a study by Miles and Skilbeck (208), and an intensive laboratory experiment with two subjects by Vernon (333) suggesting the temperamental unsuitability of certain persons for repetitive, monotonous work in industry.

A carefully controlled investigation involving a comparison of nine subjects accustomed to repetitive work with twenty-one subjects not accustomed to repetitive work is reported by Winkler (348). An analysis of the work or monotony curves of these subjects, supplemented by introspective data, leads to significant conclusions on differences in the reaction of individuals to repetitive work and a suggestive analysis of underlying factors. A bibliography is appended to this monograph. On the basis of a similarly intensive investigation, Wunderlich (351) describes three distinct types so far as reaction to repetitive work is concerned, ranging from one in whose case a disturbance in rhythm of work is accompanied by a distinct feeling tone of monotony, to the one in whose case the whole

rhythmic mechanization is completely freed from the control of consciousness, which can be directed toward other, unrelated ideas. The significance of this for industrial purposes is treated at length.

Although appearing incidentally in a great many studies on conditions of work, *fatigue* as a specific psychological problem appears in but few recent publications. Possibly the discouragement voiced by Muscio after years of experimentation and felt by other workers in this field may account for this neglect. Vernon (332) contributes a very useful summary of his own work and that of others in this field, in which psychological factors are discussed. Florence (78) summarizes the most recent results of English and American research and points out the possibility of decreasing loss from fatigue and industrial unrest in introducing the general program of industrial psychology.

The application of psychology in *training* industrial workers has been given little consideration by psychologists, although many avenues for experimental investigations along this line are doubtless open. Possibilities in this direction are suggested by Viteles (341) in a nontechnical article referring to the application of the psychology of habit in training motormen. Tramm (327), in an earlier article, describes changes introduced in the training of motormen following an analysis of this problem from the angle of the psychologist.

That a decreased time spent on training and increased production follows a consideration of psychological factors in training is claimed by Friedrich (96) in an article devoted to a discussion of underlying principles as applied in a steel plant. The dependence upon competition and the use of apparatus showing the effects of practice are recommended by the author as well as by Miles (210), who contributes a judicious statement on aids in the acquisition of muscular skill in industry. Special methods in training, apparatus showing the effects of practice used in training, and the results following from the use of such apparatus, are discussed by Berling (13).

In a volume written primarily with the purpose of describing the most important problems in the acquisition of muscular or bodily skill, Pear (249) devotes a chapter to the training of the intermediate ranks in industry. The material on training in muscular skill, what to teach, how to teach, the importance of easy methods of work, etc., as well as the final chapter of this well written volume, will doubtless be found of service by one faced with the problem of training workers in industry. Myers (238) reviews a number of laboratory studies illustrating the superiority of accuracy over speed in the early

stages of training. The importance of this in industrial training and the need for research under industrial conditions are noted. Job analysis as the basis for the scientific preparation of curricula for training workers in industry is recommended by Strong and Uhrbrock (308) in an exceedingly able monograph including job specifications for thirty jobs in the printing trade and a curriculum for training industrial executives.

Of general interest to the psychologist concerned with the training of industrial workers are volumes by Link (184) and by Book (31, 32), and an article on training by Gilbreth (110). There is also valuable material from the point of view of training in studies by Schilling (280), Hoke (125), Menzel (205), and Heinitz (118), leading to recommendations for changes in the construction and methods for making use of the typewriter.

A few additional articles, *miscellaneous* in so far as subject material is concerned, remain to be mentioned. Bingham (22) endeavors to show the existence of an applied psychology, or psychotechnology, whose aim is prediction and control for practical ends, as distinct from psychology, a science which completes its task with a description and explanation of the phenomena it studies. Examples of engineering and physics are used in illustrating the relationship between the pure science of psychology and applied psychology. Freyd (91), in an unpublished paper, objects to the distinction as unwarranted inasmuch as the method, content, and checks are the same regardless of the purpose for which psychological material is used. Confusion with pseudo-science is cited as an additional argument against the separation of applied from pure psychology. Although there is much quibbling over terminology, the danger, among other things, of concealing weaknesses in technique and neglect to search out underlying principles under the blanket term psychotechnology probably justify Freyd's position.

Mayo (203) recommends the psychology of the "total situation" as basic to a psychology of management. In so far as this new approach emphasizes the need of supplementing the limited rationalistic laboratory approach of the older psychology with the dynamic, clinical study of emotional make-up and disorders, as well as by the influence on adjustment of factors other than those ordinarily covered by the term consciousness, it is a distinct contribution in point of view. In so far as there is a failure to define more definitely the scope of the "total situation," and a pronounced tendency, in the citation of illustrative material, etc., to confuse pessimistic revery and similar

border-line conditions of emotional maladjustment with "total situation," the point of view loses in effectiveness and becomes endowed with certain of the limiting qualities ascribed by the author to academic psychology. Moreover, an evaluation of the point of view under scientifically controlled conditions remains to be made.

Irrational factors in society and the effect of disguised and undetected minor irrationalities of the "average normal person" are discussed in two articles by the same author (200, 202), who refers to the importance of these for industrial psychiatry. Eliasberg (68), in a thorough discussion of the influence of work in producing pathological changes in personality and of pathological personality in influencing the adjustment of the worker, summarizes the German literature bearing on this topic. The importance for industry of considering neuropsychiatric disturbance among workers is illustrated by case studies in an article by Scott (285).

Agencies for psychological research in industry are described by Bingham (20, 23) and Cattell (48). Wilson (346) recommends international coöperation among agencies engaged in research in industrial psychology and physiology.

Burns (37) reverts to a "group mind" in explanation of the solidity of British Trade Unionism. Although his dependence upon a group mind and his analysis of the mental characteristics of trade unionism have little to recommend them, the writer's insistence upon the importance of an analysis, from the viewpoint of the psychologist, of social phenomena such as trade unionism is in place.

An extremely valuable report on the psychology of racial differences in industrial adjustments is contributed by Young (360). A mass of data on the measurements of racial differences is critically summarized and interpreted in relation to the contribution of the immigrant and his place in American industrial civilization.

#### BIBLIOGRAPHY

1. ABEL, T. M., Tested Mentality as Related to Success in Skilled Trade Learning. *Arch. of Psychol.*, 1925, 77, 82.
2. ANON., Psychotechnische Lehrlingsprüfung in der Deutschen Mechanischen Industrie. *Prakt. Psych.*, 1922, 3, 314-318.
3. ANON., The Early History of the N. I. I. P. *J. Natl. Inst. Ind. Psych.*, 1922, 1, 2-5.
4. ANON., Hindrances to Output. *J. Natl. Inst. Ind. Psych.*, 1925, 2, 291-299.
5. ANON., Partially Standardized Tests for Junior Clerk. *Pub. Pers. Studies*, 3, No. 12.
6. ANON., Suggested Tests for a Private Branch Exchange Operator. *Pub. Pers. Studies*, 4, No. 2.

7. ARNOLD, R., Beiträge zur Eignungsprüfung für das Tischlereigewerbe. *Zsch. Angew. Psych.*, 1925, **25**, 88-116; also *Schriften*, 1925, **30**, 31.
8. BARTLETT, R. J., Psychology and Advertising. *J. Natl. Inst. Ind. Psych.*, 1925, **2**, 377-383.
9. BAUMGARTEN, F., Zur Psychologie und Psychotechnik des Versicherungswesens. *Schrift. z. Psy. Berufs.*, 1924, **27**, 62.
10. BAUMGARTEN, F., Zur Psychotechnik und Charakterologie des Regulierungsbeamten. *Schrift. z. Psy. Berufs.*, 1925, **29**, 64.
11. BAUMGARTEN, F., *Arbeitswissenschaft und Psychotechnik in Russland*. Munchen: Oldenbourg, 1924, pp. 147.
12. BACQUEYRISSE, L., Tests for Motormen and Bus Drivers. *Electric Ry. Jour.*, Aug. 23, 1924.
13. BERLING, G., Planmässiges Einführen des Menschen in den Industriellen Arbeitsablauf. *Ind. Psychot.*, 1926, **3**, 79-86.
14. BERRY, W. S., Testing Tests. *Scovill Bull.*, 1923, **9**, 5-7. Also found in LINK, H. C., Tests in Industry, *Ann. Amer. Acad.*, 1923, **110**, 32-44.
15. BIENEMAN, D., Recherches sur l'aptitude dactylographique en vue de l'orientation professionnelle. *Bur. Int. du Travail. Etudes et doc. serie. J.*
16. BILLS, M. A., Social Status of Clerical Worker and Permanence of Job. *J. App. Psych.*, 1923, **9**, 424-427.
17. BILLS, M. A., Predicting Managerial Success: A Case Study of Two Business Men. *J. Pers. Res.*, 1925, **4**, 46-51.
18. BILLS, M. A., Relation of Mental Test Score to Position and Permanency in the Company. *J. App. Psych.*, 1923, **7**, 154-156.
19. BILLS, M. A., A Method for Classifying the Jobs and Rating the Efficiency of Clerical Workers. *J. Pers. Res.*, 1923, **1**, 384-393.
20. BINGHAM, W. V., Psychology Applied. *Scient. Mo.*, 1923, **16**, 141-159.
21. BINGHAM, W. V., What Industrial Psychology Asks of Management. *Bull. Taylor Soc.*, 1924, **9**, 1-7.
22. BINGHAM, W. V., On the Possibility of an Applied Psychology. *Psychol. Rev.*, 1923, **30**, 289-305.
23. BINGHAM, W. V., Coöperative Business Research. *Ann. Amer. Acad.*, 1923, **110**, 179-189.
24. BINGHAM, W. V., and DAVIS, W. T., Intelligence Test Scores and Business Success. *J. App. Psych.*, 1924, **8**, 1-22.
25. BINNS, H., Discrimination of Wool Fabrics by Touch. *Brit. J. of Psych.*, 1926, **16**, 237-247.
26. BINNS, H., and BURT, C., A Comparison of Judgments in the Evaluation of Cloths. *J. Natl. Inst. Ind. Psych.*, 1922, **1**, 93-98.
27. BLOOMFIELD, D., *Problems in Personnel Management*. N. Y.: Wilson, 1923, pp. 209-269.
28. BOGEN, H., Zur Frage der Rangsreihenkonstanz bei Begabungs und Eignungsprüfungen. *Zsch. Angew. Psy.*, 1922, **20**, 153-191.
29. BOGEN, H., Beiträge zur kunstgewerblichen Eignungsprüfung. *Ind. Psychot.*, 1925, **2**, 12-21.
30. BOOK, W. F., Voluntary Motor Ability of the World's Champion Typists. *J. App. Psych.*, 1924, **8**, 283-308.
31. BOOK, W. F., *The Psychology of Skill, with Special Reference to Its Acquisition in Typewriting*. N. Y.: Gregg, 1925, pp. viii+257.

32. BOOK, W. F., *Learning to Typewrite*. N. Y.: Gregg, 1925, pp. 460.
33. BRAMESFELD, E., *Der Ingenieursberuf. Schrift. z. Psy. Berufs.*, 1925, 32, 94.
34. BREGMAN, E. O., Studies in Industrial Psychology. *Arch. of Psych.*, 1922, 59, 60.
35. BÜNNAGEL, E. M., Die Eignungsprüfung in ihrer Wirtschaftlichen und Sozialen Bedeutung. *Kölner Wirtschafts Stud.*, 1922, 3, 72.
36. BURNETT, I., An Experimental Investigation of Repetitive Work. *J. Natl. Inst. Ind. Psych.*, 1924, 2, 18-23.
37. BURNS, C. O., The Group Mind in Trade-Unionism. *J. Natl. Inst. Ind. Psych.*, 1924, 2, 116-124.
38. BURR, E., Minimum Intellectual Levels of Accomplishment in Industry. *J. Pers. Res.*, 1924, 3, 207-212.
39. BURR, E., Psychological Tests Applied to Factory Workers. *Arch. of Psych.*, 1922, 8, 93.
40. BURT, C., Tests for Clerical Occupations. *J. Natl. Inst. Ind. Psych.*, 1922, 1, 23-27; 79-81.
41. BURTT, H. E., and CLARK, J. C., Facial Expressions in Advertisements. *J. App. Psych.*, 1923, 5, No. 7.
42. BURTT, H. E., Measurement of Confusion Between Similar Trade Names. *Ill. Law Rev.*, 1925, 19, No. 5.
43. BURTT, H. E., and DOBELL, E. M., Curve of Forgetting for Advertising Material. *J. App. Psych.*, 1925, 9, No. 1.
44. BURTT, H. E., and BASCH, C., Legibility of Bodoni, Baskerville and Roman Type Faces. *J. App. Psych.*, 1923, 7, 237-246.
45. BURTT, H. E., Hugo Münsterberg's Contribution to Industrial Psychology. *Industrial Psych.*, 1926, 1, 165-170.
46. BURTT, H. E., and IVES, F. W., Vocational Tests for Agricultural Engineers. *J. App. Psych.*, 1923, 7, 178-187.
47. CADES, E., The Textile Industry in Philadelphia. *Psychol. Clin.*, 1924, 15, 203-228.
48. CATTELL, J. McK., The Psychological Corporation. *Ann. Amer. Acad.*, 1923, 110, 165-171.
49. CAWL, F. R., *A Method for Predicting Length of Service*. Unpublished Ph.D. Thesis, Univ. of Penna., 1926.
50. CHAPMAN, J. C., Tests for Trade Proficiency. *Ann. Amer. Acad.*, 1923, 110, 45-60.
51. CHAPMAN, E. C., *Trade Tests*. Boston: Holt, 1924, pp. 435.
52. CHARTERS, W. W., and WHITLEY, I. B., *An Analysis of Secretarial Duties and Traits*. Baltimore: Williams & Wilkins, 1924, pp. 186.
53. CLAPARÈDE, A., L'Orientation Professionnelle, Ses Problèmes et Ses Méthodes. *Int. Labour Office, Studies and Reports*, Series J, No. 1, Geneva, 1922. Also in English "Problems and Methods of Vocational Guidance."
54. CLETON and KNIGHT, Validity of Character Judgment Based on External Criteria. *J. App. Psych.*, 1924, 8, 215-232.
55. CLOTHIER, R. C., An Occupational Survey. *J. Pers. Res.*, 1923, 10, 427-450.
56. COUVÉ, R., Bericht über die psychotechnische Untersuchung von zwei Eisenbahnzusammenstößen. *Indust. Psych.*, 1924, 1, 160-168.

57. COUVÉ, R., Eisenbahnbetriebsunfälle und Psychotechnik. *Prakt. Psych.*, 1922, **4**, 144-201.
58. COUVÉ, R., Die Psychotechnische Eignungsprüfung von Eisenbahnverkehrsbeamten. *Ind. Psychot.*, 1924, **1**, 22-29.
59. COUVÉ, R., Lehrlingeignungsprüfungen bei der Deutschen Reichsbahn-Gesellschaft. *Ind. Psychot.*, 1925, **2**, 290-303.
60. COUVÉ, R., *Die Psychotechnik im Dienste der Deutschen Reichsbahn*. V. D. I. Verlag, 1925.
61. COWDERY, K. M., Measures of General Intelligence as Indices of Success in Trade Learning. *J. App. Psych.*, 1922, **6**, 311-329.
62. CRAIG, D. R., The Preference-Interest Questionnaire in Selecting Retail Saleswomen. *J. Pers. Res.*, 1925, **3**, 366-374.
63. CULLIS, W., Industry Psychology. Some Ways of Increasing Output of Work. *J. Natl. Inst. Ind. Psych.*, 1924, **2**, 125-128.
64. DANNENBERG, Erfahrungen bei der Prüfung und Berufsberatung Künstlerisch Begabten in Berlin. *Prakt. Psych.*, 1923, **4**, 236-240.
65. DORVAIN, N., Conducteurs D'Autobus et de Tramways à Paris, etc. *La Science et La Vie*, 1925, **27**, No. 93.
66. DÜCK, Die Berufseignung der Kanzleiangestellten. *Schrift. z. Psy. Berufs.*, 1919, **6**, pp. 24.
67. DUNLAP, K., Fact and Fable in Character Analysis. *Ann. Amer. Acad.*, 1923, **110**, 74-81.
68. ELIASBERG, W., Grundris einer allgemeinen Arbeitspathologie. *Schrift. z. Psy. Berufs.*, 1924, **28**, 41.
69. ELTON, P. M., An Analysis of Individual Differences in the Output of Silk Weavers. *Rept. Ind. Fat. Res. Board*, London, 1922, No. 17, pp. 38.
70. FARMER, E., and BEVINGTON, S., An Experiment in Introduction of Rest Pauses. *J. Natl. Inst. Ind. Psych.*, 1922, **1**, 89-92.
71. FARMER, E., Economy of Human Effort in Industry. *J. Natl. Inst. Ind. Psych.*, 1922, **1**, 18-22.
72. FARMER, E., Interconnection Between Economics and Industrial Psychology. *J. Natl. Inst. Ind. Psych.*, 1924, **2**, 78-83.
73. FARMER, ADAMS, and STEPHENSON, An Investigation in a Coal Mine. *J. Natl. Inst. Ind. Psych.*, 1922, **1**, 125.
74. FERNALD, G. M., and SULLIVAN, E. B., Personnel Work with Los Angeles Police Department. *J. of Delinquency*, 1926, **10**, 252-268.
75. FILER, H. A., and O'Rourke, L. J., Progress in Civil Service Tests. *J. Pers. Res.*, 1923, **1**, 484-520.
76. FISCHER, L., *Die Arbeit des Patentingenieurs*. Berlin: Stenger, 1923, pp. vi+96.
77. FISHER, B., *Mental Causes of Accidents*, 1922. Houghton Mifflin, pp. x+315.
78. FLORENCE, S., *Economics of Fatigue and Unrest*. Allen and Unwin, 1924.
79. FONTÉGNE, J., *L'Orientation Professionnelle*. Neuchatel et Paris, 1921, pp. 263.
80. FOSTER, W. R., Vocational Selection in a Chocolate Factory. *J. Natl. Inst. Ind. Psych.*, 1924, **2**, 159-163.
81. FRANK, M., Psychotechnische Begutachtung von Unfallsbehütungsplakaten. *Ind. Psychot.*, 1926, **3**, 1-16.

82. FRANKEN, R. B., Advertising Appeals Selected by Method of Direct Impression. *J. App. Psych.*, 1924, 8, 232-245.
83. FRASER, J. A., Vocational Selection and Training of Operatives for Weaving Industries. *J. Natl. Inst. Ind. Psych.*, 1924, 2, 88-93.
84. FREYD, M., The Personalities of the Socially and Mechanically Inclined. *Psychol. Monog.*, 1924, 33, No. 4 (Whole No. 51), 44-52.
85. FREYD, M., The Graphic Rating Scale. *J. Educ. Psychol.*, 1923, 14, 84-102.
86. FREYD, M., Unpublished Special Report on the Use of Psychological Tests in the Selection of Salesmen at the Federated Engineers Development Corporation. New York, 1922, pp. 20.
87. FREYD, M., A Graphic Rating Scale for Teachers. *J. Educ. Res.*, 1923, 8, 433-439.
88. FREYD, M., Measurement in Vocational Selection. *J. Pers. Res.*, 1923, 2, 220-224, 268-284, 377-385.
89. FREYD, M., A Test Series for Journalistic Aptitude. *J. App. Psych.*, 1921, 5, 46-56.
90. FREYD, M., The Measurement of Interests in Vocational Selection. *J. Pers. Res.*, 1922, 1, 319-328.
91. FREYD, M., How Should Psychology be Applied? Paper before A. P. A. Dec. 29, 1925. To appear in *Psych. Review*.
92. FREYD, M., The Analysis of Keyed Returns. *Harvard Business Rev.*, 1926, 4.
93. FREYD, M., The Experimental Evaluation of a Merchandising Unit. *Harvard Business Rev.*, 1926, 4, 196-202.
94. FREYD, M., The Statistical Viewpoint in Vocational Selection. *J. App. Psych.*, 1925, 9, 349-356.
95. FRIEDLANDER, K. T., *Der Weg Zum Käufer*. Berlin: Springer, 1923, pp. 18.
96. FRIEDRICH, A., Das Anlernen auf Psychotechnische Grundlage, "Fähigkeitschulung." *Prakt. Psych.*, 1922, 4, 1-9.
97. FRIEDRICH, A., Die Analyse des Schlosserberufs. *Prakt. Psych.*, 1922, 3, 287-300.
98. FRIEDRICH, A., Die Einstellungsprüfung der Schlosser und der Dreherlehrlinge immerhalb der Friedr. Krupp-A. G. Essen. *Prakt. Psych.*, 1922, 3, 159-166.
99. FRYER, D., Psychology and Industry in France and England. *J. Pers. Res.*, 1924, 2, 396-402.
100. FRYER, D., Industrial Dissatisfaction. *Ind. Psych.*, 1926, 1, 25-29.
101. GALLUP, G. H., Tracts of Successful Retail Salespeople. *J. Pers. Res.*, 1926, 4, 474-482.
102. GARFIELD, E., The Measurement of Motor Ability. *Arch. of Psych.*, 1923, No. 62, pp. 46.
103. GIESE, E., Berufsprüfungen in Reichstelegraphendienst. *Schrift. z. Psy. Berufs.*, 1923, 24, 74.
104. GIESE, F., *Psychotechnische Eignungsprüfungen*. Langensolza: Winde u. Klanwell, 1921, pp. iii+364.
105. GIESE, F., Handbuch Psychotechnische Eignungsprüfung. Halle: Wundt und Klanwell, 1925, pp. 871.

106. GIESE, F., *Psychotechnische Praktikum*. Halle: Winde u. Klanwell, 1923, pp. 153.
107. GILBRETH, B. G. and L., The Efficiency Engineer and Industrial Psychologist. *J. Natl. Inst. Ind. Psych.*, 1924, 2, 40-45.
108. GILBRETH, F. and L., Achievements of Motion Psychology. *Bull. Taylor Soc.*, 1924, 9, 259-260.
109. GILBRETH, L., Present State of Industrial Psychology. *Mech. Engineering*, 1925, pp. —.
110. GILBRETH, L., Training Employees in Production Work. *J. of Soc. Aut. Eng.*, 1925.
111. GOLDSMITH, D., The Use of the Personal History Blank as a Salesmanship Test. *J. App. Psych.*, 1922, 6, 148-155.
112. GRIFFITTS, C. H., *Fundamentals of Vocational Psychology*. N. Y.: Macmillan, 1924, pp. 372.
113. GRONERT, M. L., A Prognostic Test in Typewriting. *J. Educ. Psych.*, 1925, 16, 182.
114. HAHN, H., Amerikanische Reklamenpsychologie. *Ind. Psychot.*, 1925, 2, 33-42.
115. HALLBAUER, U., Prüfung der Aufmerksamkeit und Reaktionsweise von Triebwagenführern. *Prakt. Psych.*, 1923, 4, 104-113.
116. HARRISON, H. D., *Industrial Psychology and Production of Wealth*. N. Y.: Dodd, Mead, 1926, pp. 184.
117. HARTUNGEN, C., *Psychologie der Reklame*. Stuttgart: Polschel, 1921, pp. 269.
118. HEINITZ, Vorstudien über die psychotechnischen Arbeitbedingungen des Machineschreibens. *Schrift. z. Psy. Ber.*, 1918, 4, pp. 56.
119. HEPNER, H. W., Better Judgments of Men. *Ind. Psych.*, 1926, 1, 19-25.
120. HEUGEL, N., Beiträge zur Berufskunde und Eignungsprüfung des Schmiedes. *Ind. Psychot.*, 1925, 2, 359-367.
121. HELLER, O., Eignungsprüfung und Unfallvorbeugung in der Holzindustrie. *Ind. Psychot.*, 1924, 1, 99-118.
122. HILDEBRANDT, H., Versuche mit Psychotechnischen Eignungsprüfungen für Ingenieurlehrlinge. *Ind. Psychot.*, 1925, 2, 42-49.
123. HIRSCH, E., Kurzpausen und Arbeitseignung. *Ind. Psychot.*, 1925, 2, 371-375.
124. HOKE, R. E., Improvement of Speed and Accuracy in Typing. *Johns Hopkins Univ., Studies in Educ.*, 1922, No. 6, pp. 118.
125. HOKE, R. E., Improvement of Speed and Accuracy in Typing. *Johns Hopkins Univ., Studies in Educ.*, 1922, No. 7.
126. HOLLINGWORTH, H. L., *Judging Human Character*. N. Y.: Appleton, 1922, pp. viii+268.
127. HOLLINGWORTH, H. L., and POFFENBERGER, A. T., *Applied Psychology*. N. Y.: Appleton, 1923, pp. 431.
128. HOLMES, J. L., Free Association Method as Measure of Efficiency in Advertising. *J. App. Psych.*, 1925, 9, 60-66.
129. Industrial Fatigue Research Board, Second Annual Report. London, 1922, pp. 65.
130. Industrial Fatigue Research Board, Third Annual Report. London, 1923, pp. 83.

131. Industrial Fatigue Research Board, Fourth Annual Report. London, 1924, pp. 65.
132. Industrial Fatigue Research Board, Fifth Annual Report. London, 1925, pp. 76.
133. Industrial Fatigue Research Board, Report No. 19, pp. 36, 1922, Two Contributions to the Study of Accident Causation.
134. Industrial Fatigue Research Board, Report No. 27, Results of Investigations in Certain Industries. London, 1924, pp. v+17.
135. HUTH, A., Die Münchener Eignungsprüfung für Buchdrucker und Schriftsetzer. *Zsch. Angew. Psych.*, 1920, 20, 365-390. Also *Schriften*, 1922, 21, pp. 28.
136. IKIN, A. G., The Qualities Desirable in a Foreman. *J. Natl. Inst. Ind. Psych.*, 1924, 2, 13-17.
137. JOHNSON, O. R., Basing Selection of Salesman on Analysis of Company Experience. *Service Bull. Bur. Person. Res., Carnegie Inst. of Technology*, 1923, 5, pp. 22.
138. JONES, E. S., Effect of Letters and Syllables in Publicity. *J. App. Psych.*, 1922, 6, 198-204.
139. KAFKA, G., Zwei neue Apparate zur Eignungsprüfung der Strassenbahner. *Zsch. Angew. Psych.*, 1921, Beiheft 29, pp. 95-102.
140. KELLNER, H., Die Urteilsbildung bei der Psychotechnische Prüfung. *Ind. Psychot.*, 1925, 2, 303-315.
141. KENAGY, H. G., and YOAKUM, C. S., *Selection and Training of Salesmen*. N. Y.: McGraw-Hill, 1925, pp. 380.
142. KENAGY, H. G., Characteristics of Successful Salesmen. *Service Bull. Person. Res., Carnegie Inst. Technology*, 1923, 5, No. 5, pp. 31.
143. KINGSBURY, F. A., The Principles Involved in Securing Service Ratings as Exemplified in a Large Bank. *Pub. Pers. Studies*, 1925, 3, 70-84.
144. KINGSBURY, F. A., Analyzing Ratings and Training Raters. *J. Pers. Res.*, 1922-1923, 1, 377-383.
145. KINGSBURY, F. A., and CRENNAN, C. H. (Editors), *Psychology in Business*. Ann. Amer. Acad. Pol. Soc. Sci., 1923, 110, No. 199.
146. KINGSBURY, F. A., Making Rating Scales Work. *J. Pers. Res.*, 1925, 4, 1-6.
147. KINGSBURY, F. A., and KORNHAUSER, A. W., *Psychological Tests in Business*. Univ. of Chi. Press, 1924, pp. 194.
148. KITSON, H. D., Height and Weight as Factors in Salesmanship. *J. Pers. Res.*, 1922, 1, 289-294.
149. KITSON, H. D., A Critical Age as a Factor in Labor Turnover. *J. Indust. Hygiene*, 1922, 4, 199-200.
150. KITSON, H. D., and DONHAM, G. L., The Personality of Workers in the Metal Trades. *J. Pers. Res.*, 1924, 2, 460-466.
151. KITSON, H. D., *Psychology of Vocational Adjustment*. Phila.: Lippincott, 1925, pp. 273.
152. KITSON, H. D., and MORGAN, H. K., Relation Between Size of Type in Headline and Size of Advertisement. *J. App. Psych.*, 1924, 8, 446-448.
153. KITSON, H. D., Understanding the Consumer's Mind. *Ann. Amer. Acad.*, 1923, 110, 131-139.

154. KITSON, H. D., Color in Magazine Advertising. *J. App. Psych.*, 1922, 6, 64-66.
155. KITSON, H. D., Development of Art Forms in Magazine Advertising. *J. App. Psych.*, 1922, 6, 59-64.
156. KITSON, H. D., Minor Studies in Psychology of Advertising—Introduction to the Use of Historical Method in Investigation of Problems of Advertising. *J. App. Psych.*, 1921, 5, 5-13.
157. KITSON, H. D., *Scientific Advertising*. N. Y.: Codex, 1926.
158. KITSON, H. D., A Statistical Study of Vocational Histories. *J. Pers. Res.*, 1926, 4, 429-432.
159. KITSON, H. D., Extra Incentive Wage Plans from Psychological Point of View. *Bull. Am. Management Assn.*, New York Production Exec. Series, 1925, 9.
160. KITSON, H. D., and CAMPBELL, C., Relation Between Labor Turnover and Industrial Accidents. *J. Indust. Hygiene*, 1923, 5, 92-96.
161. KITSON, H. D., *The Mind of the Buyer*. N. Y.: Macmillan, 1922, pp. x+211.
162. KITSON, H. D., A Study of the Output of Workers under a Particular Wage-Incentive. *Univ. J. of Business*, 1922, 1, 54-68.
163. KITSON, H. D., A Shift of Emphasis Needed in Personnel Research. *J. App. Psych.*, 1922, 6, 141-148.
164. KITSON, H. D., and DONHAM, G. L., A Statistical Study of the Personality of the Workers in Metal Trades. *J. Pers. Res.*, 1924, 2, pp. 460-466.
165. KITSON, H. D., and CAMPBELL, C., Seasonal Fluctuations in Frequency of Industrial Accidents. *J. Indust. Hygiene*, 1924, pp. —.
166. KITSON, H. D., and CAMPBELL, J. J., The Package as a Feature in Magazine Advertising. *J. App. Psych.*, 1924, 8, 444-445.
167. KLÖTZEL, C. Z., Psychologische Grundlagen der Film Reklame. *Prakt. Psych.*, 1922, 3, 372-376.
168. KLUTKE, O., Beiträge zur psychotechnischen Eignungsprüfung für den Fernsprechdienst. *Prakt. Psych.*, 1922, 3, 93-110.
169. KLUTKE, O., Psychotechnische Eignungsprüfung für Funker. *Prakt. Psych.*, 1923, 4, 289-294.
170. KOHIS, C., Übung Werkstattwichtiger Funktionen an Lehrlingen. *Ind. Psychot.*, 1925, 2, 97-108.
171. KÖNIG, T., *Reklame Psychologie*. Berlin: Oldenbourg, 1924, pp. 206.
172. KORNHAUSER, A. W., Psychological Tests for Office Occupations. *Univ. J. of Business*, 1923, 2, 23-51.
173. KORNHAUSER, A. W., Some Business Applications of a Mental Alertness Test. *J. Pers. Res.*, 1922, 1, 103-121.
174. KORNHAUSER, A. W., A Statistical Study of a Group of Specialized Office Workers. *J. Pers. Res.*, 1923, 2, 103-123.
175. KORNHAUSER, A. W., A Reinterpretation of the Statistical Method of Army Trade Tests. *J. App. Psych.*, 1923, 7, 339-348.
176. KORNHAUSER, A. W., The Psychology of Vocational Selection. *PSYCHOL. BULL.*, 1922, 19, 192-229.
177. KORNHAUSER, A. W., Intelligence Test Ratings of Occupational Groups. *Amer. Econ. Rev.*, 1925, 15, 110-122.

178. KORNHAUSER, A. W., The Motives in Industry Problem. *Ann. Amer. Acad.*, 1923, 110, 105-116.
179. KORNHAUSER, A. W., and KINGSBURY, F. A., *Psychological Tests in Business*. Univ. of Chi. Press, 1923, pp. 194.
180. LAHY, J. M., La Sélection Psychophysiologique des Machinistes. *L'Année Psych.*, 1924, 25, pp. 106-170.
181. LAIRD, D. A., *The Psychology of Selecting Men*. N. Y.: McGraw-Hill, 1925, pp. 200.
182. LAIRD, D. A., The Basis of Tooth Paste Sales in a Representative Community. *J. App. Psych.*, 1923, 7, 173-178.
183. LANDIS, C., Justification of Judgments. *J. Pers. Res.*, 1925, 4, 17-19.
184. LINK, H. C., *Education in Industry*. N. Y.: Macmillan, 1923, pp. xv+265.
185. LINK, H. C., Psychological Tests in Industry. *Ann. Amer. Acad.*, 1923, 110, 32-44.
186. LINK, H. C., *Employment Psychology*. Macmillan.
187. LIPMANN, Bibliographie zur psychologischen Berufsberatung, Berufseignungsforschung und Berufskunde. *Schrift. z. Psy. Berufs.*, 1922, 20, pp. 60.
188. LIPMANN, O., *Das Arbeitszeitproblem*. Berlin: Inst. Angew. Psych., 1924.
189. LIPMANN, O., Wirtschafts Psychologie und Psychologische Berufsberatung. *Schrift. z. Psy. der Berufs.*, 1920, 1, pp. 26.
190. LIPMANN und STOLZENBERG, Methoden zur Auslese Hochwertigen Facharbeiter der Metalindustrie. *Schrift. z. Psy. Berufs.*, 1920, 11, pp. 79.
191. LYSINSKI, E., *Psychologie des Betriebes*. Berlin: Spaeth u. Lude, 1923, pp. 303.
192. MANSON, G., Bibliography on Psychological Tests. *J. Pers. Res.*, 1925, 4, 1-28.
193. MANSON, G. E., What Can the Application Blank Tell? Evaluation of Items in Personal History Records of Four Thousand Life Insurance Salesmen. *J. Pers. Res.*, 1925, 4, 73-99.
194. MANSON, G. E., The Personal History Record. Relation Between Amount of Insurance Sold and Certain Items on the Previous History of the Salesman. Unpublished Dissertation. Carnegie Inst. of Technology, 1923.
195. MARBE, K., Über Unfallversicherungs und Psychotechnik. *Prakt. Psych.*, 1923, 4, 257-264.
196. MARTIN, E. M., An Aptitude Test for Policemen. *J. Crim. Law and Crim.*, 1923, 14, 376-404.
197. MARTIN, E. M., New Methods of Selecting Policemen. *Nat. Municipal Rev.*, 1923, 12, 671-681.
198. MAYO, E., Day Dreaming and Output in a Spinning Mill. *J. Natl. Inst. Ind. Psych.*, 1925, 2, 203-209.
199. MAYO, E., The Irrational Factor in Human Behavior. "Night-Mind" in Industry. *Ann. Amer. Acad.*, 1923, 110, 117-131.
200. MAYO, E., Irrationality and Reverie. *J. Pers. Res.*, 1923, 1, 477-483.
201. MAYO, E., Reverie and Industrial Fatigue. *J. Pers. Res.*, 1924, 3, 273-281.
202. MAYO, E., The Irrational Factor in Society. *J. Pers. Res.*, 1923, 1, 419-426.

203. MAYO, E., Basis of Industrial Psychology. *Bull. Taylor Soc.*, 1924, 9, 249-259.
204. MEINE, F., Job Analysis for Employment Purposes. *Ann. Amer. Acad.*, 1923, 110, 22-32.
205. MENZEL, Beiträge zur Psychoteknik der Schreibmaschine: Vergleichendes Methodik, etc. *Prakt. Psych.*, 1912, 2, 269-274.
206. METCALF, H. E., *Linking Science with Industry*. Baltimore: Williams & Wilkins, 1925, pp. 206.
207. MILES, G. H., Rest Pauses. *J. Natl. Inst. Ind. Psych.*, 1923, 1, 287-291.
208. MILES, G. H., and SKILBECK, O. A., An Experiment in Change of Work. *J. Natl. Inst. Ind. Psych.*, 1922, 1, 236-239.
209. MILES, G. H., Berlin Conference in Applied Psychology. *J. Natl. Inst. Ind. Psych.*, 1923, 1, 190-192.
210. MILES, G. H., Acquisition of Muscular Skill in Industry. *J. Natl. Inst. Ind. Psych.*, 1926, 3, 45-50.
211. MILES, G. H., Economy and Safety in Transport. *J. Natl. Inst. Ind. Psych.*, 1925, 2, 192-197.
212. MOEDE, W., Meisterprüfung. *Prakt. Psych.*, 1921, 3, 12-15.
213. MOEDE, W., Die Psychotechnische Eignungsprüfung des Industriellen Lehrlings. *Prakt. Psych.*, 1919, 1, 6-18, 65-81.
214. MOEDE, W., Unfallverhütung auf Psychotechnische Grundlage. *Ind. Psychot.*, 1926, 3, 16-22.
215. MOORE, B. V., Personnel Selection of Graduate Engineers. *Psychol. Monog.*, 1921, 30, No. 5 (Whole No. 138), pp. 85.
216. MOORE, B. V., A Tested Method of Using Tests in Vocational Guidance. *Sch. and Soc.*, 1923, 18, 761-764.
217. MOSS, F. A., and ALLEN, H. H., The Personal Equation in Automobile Driving. *J. Socy. Auto. Eng.*, 1925, 16, 415-420.
218. MOSS, F. A., Standardized Tests for Automobile Drivers. *Pub. Pers. Stud.*, 1925, 3, 147-165.
219. MOSS, F. A., and TELFORD, F., Suggested Tests for Senior Library Assistant, Circulation Dept. *Pub. Pers. Stud.*, 1925, 3, 97-110.
220. MOSS, F. A., and TELFORD, F., Suggested Tests for Senior Clerk. *Pub. Pers. Stud.*, 1924, 2, 195-213.
221. MOSS, F. A., Ability to Get Along with People. *Ind. Psych.*, 1926, 1, No. 3.
222. MOSS, F. A., Suggested Tests for Hospital Attendant. *Pub. Pers. Stud.*, 1924, 2, 167-178.
223. MOSS, F. A., and TELFORD, F., Suggested Tests for Janitors. *Pub. Pers. Stud.*, 1925, 3, 26-32.
224. MOSS, F. A., and TELFORD, F., Suggested Tests for Food Inspector. *Pub. Pers. Stud.*, 1924, 2, 254-263.
225. MOSS, F. A., and TELFORD, F., Suggested Tests for Senior Library Assistant, Circulation Department. *Pub. Pers. Stud.*, 1925, 3, 97-110.
226. MOSS, F. A., Suggested Test for Painter. *Pub. Pers. Stud.*, 1925, 3, 131-136.
227. MOSS, F. A., Standardized Tests in Bacteriology. *Pub. Pers. Stud.*, 1925, 3, pp. 52-67.

228. MOSS, F. A., Standardized Tests in Pathology. *Pub. Pers. Stud.*, 1925, 3, pp. 172-186.
229. MUSCIO, B., and BROOKE, R. ST. C., An Investigation into Packing Chocolates. *J. Natl. Inst. Ind. Psych.*, 1922, 1, 68-75.
230. MUSCIO, B., Vocational Guidance. (A Review of the Literature.) *Indust. Fatigue Res. Board*, Report No. 12. London, 1921.
231. MUSCIO, B., and SOWTON, S. C. M., Vocational Tests and Typewriting. *Brit. J. Psych.*, 1923, 13, 344-369.
232. MUSCIO, B., The Psycho-Physiological Capacities Required by the Hand Compositor. *Indust. Fatigue Res. Board*, Rept. No. 16, Sec. A.
233. MUSCIO, B., and EYRE, A., Measurements of Physical Strength with Reference to Vocational Guidance. Section B, *Rept. Ind. Fat. Res. Board*, No. 16. London, 1922, pp. 38-73.
234. MYERS, C. S., International Conference on Vocational Guidance at Milan. *J. Natl. Inst. Ind. Psych.*, 1923, 1, 251-254.
235. MYERS, C. S., The Human Side of Industry. *J. Natl. Inst. Ind. Psych.*, 1923, 1, 309-312.
236. MYERS, C. S., The Efficiency Engineer and Industrial Psychologist. *J. Natl. Inst. Ind. Psych.*, 1923, 1, 168-172.
237. MYERS, C. S., *Industrial Psychology in Great Britain*. London: Cape, 1925, pp. 164.
238. MYERS, G. C., Speed versus Accuracy in the Development of Industrial Skill. *J. Pers. Res.*, 1925, 4, 20-22.
239. NIXON, H. K., Two Studies of Attention to Advertisements. *J. App. Psych.*, 1925, 9, 176-188.
240. OMWAKE, K. T., The Value of Photographs and Handwriting in Estimating Intelligence. *Pub. Pers. Stud.*, 1925, 3, 2-16.
241. O'ROURKE, L. J., Report of the Director of Research, U. S. Civil Service, in Forty-first Report, U. S. Civil Service Commission, 1924, pp. xlvi-lxii.
242. O'ROURKE, L. J., Saving Dollars and Energy by Personnel Research. *J. Pers. Res.*, 1926, 4, 351-364, 433-450.
243. OSTRANDER, J., Some Observations Upon 150 Probationary Policemen of Detroit Police Dept. *Ment. Hyg.*, 1925, 9, 60-74.
244. PATERSON, D. G., The Scott Company's File Clerk's Test. *J. Pers. Res.*, 1923, 1, 547-561.
245. PATERSON, D. G., The Scott Co. Graphic Rating Scale. *J. Pers. Res.*, 1922, 1, 361-376.
246. PATERSON, D. G., The Vocational Testing Movement. *J. Pers. Res.*, 1922, 1, 295-305.
247. PATERSON, D. G., Methods of Rating Human Qualities. *Ann. Amer. Acad.*, 1923, 110, 81-93.
248. PATTEN, E. F., An Experiment in Testing Engine Lathe Aptitude. *J. App. Psych.*, 1923, 7, 16-29.
249. PEAK, T. H., *Skill in Work and Play*. N. Y.: Dutton, 1924, pp. 107.
250. PEAK, T. H., Psychology and Some Problems of Advertising. *Natl. Inst. Ind. Psych.*, 1925, 2, 262-268.
251. PERSON, H. S., Industrial Psychology. *Bull. Taylor Soc.*, 1924, 9, 163-171.
252. PINTNER, R., *Intelligence Testing*. N. Y.: Holt, 1923, pp. 398.

253. PIORKOWSKI, C., Beiträge zur psychotechnische Methodologie der Wirtschaftlichen Berufseignung. *Beihefte zur Angew. Psych.*, 1915, 11, 16.
254. PIORKOWSKI, C., Sinnesfähigkeit und Fehlassoziationen bei Plakaten und Inseraten. *Prakt. Psych.*, 1922, 3, 141-146.
255. PIORKOWSKI, H., Beiträge zur Experimentellen Reklame-Psychotechnik. *Prakt. Psych.*, 1922, 3, 351-372.
256. PIORKOWSKI, H., Eine Optische Tauschungsfigur im Schaufenster. *Ind. Psychot.*, 1925, 2, 82-85.
257. PIORKOWSKI, H., Der Anzeigender Dresdener Neuster Nachrichten. *Ind. Psychot.*, 1925, 2, 321-338.
258. POFFENBERGER, A. T., Conditions of Belief in Advertising. *J. App. Psych.*, 1923, 7, 1-10.
259. POFFENBERGER, A. T., Return Coupon as Measure of Advertising Efficiency. *J. App. Psych.*, 1923, 7, 202-209.
260. POFFENBERGER, A. T., A Critical Examination of the Usual Employment Methods. *Ann. Amer. Acad.*, 1923, 110, 13-21.
261. POFFENBERGER, A. T., *Psychology in Advertising*. N. Y.: Shaw, 1925, pp. 632.
262. POFFENBERGER, A. T., Measuring the Comprehension of Advertisements. *J. App. Psych.*, 1923, 7, 364-370.
263. POFFENBERGER, A. T., The Selection of a Successful Secretary. *J. App. Psych.*, 1922, 6, 155-160.
264. POFFENBERGER, A. T., and FRANKEN, R. B., A Study of the Appropriateness of Type Faces. *J. App. Psych.*, 1923, 7, 312-329.
- 264a. PRUETTE, L., The Selection of Girl Cashiers. *Ind. Psych.*, 1926, 1, 277-279.
265. READ, T. T., Industrial Accidents Prevention. *J. Pers. Res.*, 1924, 3, 252-255.
266. REAM, M. J., *Ability to Sell*. Baltimore: Williams & Wilkins, 1924, pp. 64.
267. REAM, M. J., A Group Will-Temperament Test. *J. Educ. Psychol.*, 1922, 13, 7-16.
268. ROBINSON, E. S., Factors Affecting Human Efficiency. *Ann. Amer. Acad.*, 1923, 110, 94-105.
269. ROGERS, R. W., Some Empirical Tests in Vocational Selection. *Arch. of Psych.*, 1922, No. 49, pp. 47.
270. ROWNTREE, J. S., JR., The Scope of Vocational Selection in Industry. *J. Natl. Inst. Ind. Psych.*, 1923, 1, 240-245.
271. RUFFER, W., Auswertungserfahren der Psychotechnischen Prüfstelle der Osram G. m. b. h. *Prakt. Psych.*, 1923, 4, 225-236.
272. RUFFER, W., Über die Organization und Bewährung der Eignungsprüfung der Fabrik S der Osram G. *Ind. Psychot.*, 1926, 3, 35-46.
273. RUGG, H. O., Is the Rating of Human Character Practicable? *J. Ed. Psych.*, 1921, 13; 1922, 14.
274. RUGGLES, A. W., A Diagnostic Test of Aptitude for Clerical Office Work. *Columbia Univ. Contrib. to Educ.*, No. 148, 1924, pp. 85.
275. RUSSELL, W., and COPE, G. V., A Method of Rating the History and Achievements of Applicants. *Pub. Pers. Stud.*, 1925, 3, 202-209.
276. SACHS, Die Fräger der Experimentellen Eignungspsychologie. *Schrift. z. Psy. Berufs.*, 1923, 25, pp. 34.

277. SACHS, Zur Organization der Eignungspsychologie. *Schrift. z. Psych. Ber.*, 1920, 14, pp. 16.
278. SACHS, H., Studien zur Eignungsprüfung der Strassenbahnführer. *Zsch. Angew. Psych.*, 1921, 17, 199-225.
279. SCHACKWITZ, A., *Über Psychologische Eignungsprüfungen für Verkehrsberufe. Eine Begutachtung Ihrer Theoretischen und Praktischen Wertes Erläutert durch eine Untersuchung von Strassenbahnführern*. Berlin: Springer, 1920, pp. 187.
280. SCHILLING, Beiträge zur Psychoteknik der Schreibmaschine und ihrer Bedienung u. s. w. *Prakt. Psych.*, 1921, 3, 21-31, 65-75.
281. SCHLESINGER, G., Psychotechnik in Amerika. *Ind. Psychot.*, 1925, 2, 161-170.
282. SCHNEIDER, A., Eignungsprüfung und Erfolgskontrolle in einem Grossbetriebe der Elektroindustrie. *Ind. Psychot.*, 1925, 2, 108-118.
283. SCHULTE, Die Berufseignung des Damenfriseurs. *Schrift. z. Psych. Berufs.*, 1921, 17, pp. 77.
284. SCHWARZE, B., Beiträge zur Frage der Personalauswahl in Grossbetrieben mit besonderer Berücksichtigung der Deutschen Reichsbahn. *Ind. Psychot.*, 1924, 1, 17-21.
285. SCOTT, A., Neuropsychiatric Work in Industry. *Ment. Hyg.*, 1923, 3, 521-538.
286. SCOTT, W. D., *Increasing Human Efficiency in Business*. N. Y.: Macmillan, 1923.
287. SCOTT, W. D., *Psychology of Advertising*. Boston: Small, Maynard, 1921.
288. SCOTT, W. D., and CLOTHIER, R. C., *Personnel Management*. N. Y.: Shaw, 1923, pp. xii+643.
289. SHELOW, S. M., Research in Selection of Motormen in Milwaukee. *J. Per. Res.*, 1925, 4, 222-237.
290. SHERT, O. C., Suggested Tests for a Shift Engineman. *Pub. Pers. Stud.*, 1925, 3, 320-331.
291. SNOW, A. J., Advanced Course in Experimental Psychology Applied to Advertising. *J. App. Psych.*, 1923, 7, 360-364.
292. SNOW, A. J., An Experiment in the Validity of Judging Human Ability. *J. App. Psych.*, 1924, 8, 339-346.
293. SNOW, A. J., *Psychology in Business Relations*. N. Y.: Shaw, 1925, pp. 562.
294. SNOW, A. J., *Psychology in Personal Selling*. N. Y.: Shaw, 1925.
295. SNOW, A. J., Tests for Chauffeurs. *Ind. Psych.*, 1926, 1, 30-46.
296. SNOW, A. J., Labor Turnover and Mental Alertness Test Scores. *J. App. Psych.*, 1923, 7, 285-290.
297. SNOW, A. J., Tests for Transportation Pilots. *J. App. Psych.*, 1926, 10.
298. SPIELMAN, W., Vocational Selection of Weavers. *J. Natl. Inst. Ind. Psych.*, 1925, 2, 256-261.
299. SPIELMAN, W., Vocational Tests for Selecting Packers and Pipers. *J. Natl. Inst. Ind. Psych.*, 1925, 2, 365-372.
300. SPIELMAN, W., Vocational Tests for Dressmakers' Apprentices. *J. Natl. Inst. Ind. Psych.*, 1923, 1, 277-282.
301. STARCH, D., *Principles of Advertising*. N. Y.: Shaw, 1923, pp. 998.

302. STARCH, D., Research Methods in Advertising. *Ann. Amer. Acad.*, 1923, 110, 139-143.
303. STARCH, D., The Use and Limitation of Psychological Tests. *Harvard Business Rev.*, 1922, 1, 71-80.
304. STARCH, D., Testing the Effectiveness of Advertisements. *Harvard Business Rev.*, 1923, 2, 464-475.
305. STENQUIST, J. L., *Measurements of Mechanical Ability*. N. Y.: Teachers College, Columbia University, 1923.
306. STERN, W., Über eine psychologische Eignungsprüfung für Strassenbahn-fahrinnen. *Schrift. z. Psy. Berufs.*, 1918, 2, pp. 16.
307. STEVENSON, J. A., Psychology in Salesmanship. *Ann. Amer. Acad.*, 1923, 110, 144-155.
308. STRONG and UHRBROCK, *Job Analysis and the Curriculum*. Baltimore: Williams & Wilkins, 1923, pp. 136.
309. STRONG, E. K., *Psychology of Selling and Advertising*. N. Y.: McGraw-Hill, 1925.
310. SWARTZ, G. O., Selecting Salesmen: Getting the Right Man the First Time. *J. Pers. Res.*, 1924, 2, 457-459.
311. SWIFT, E. J., *Business Power Through Psychology*. N. Y.: Scribners, 1925, pp. 397.
312. TAGG, M., Industrial Psychology in Russia. *J. Natl. Inst. Ind. Psych.*, 1925, 2, 359-364.
313. TAGG, M., The Makeup of the Engineering Worker. *J. Natl. Inst. Ind. Psych.*, 1923, 1, 313-325.
314. TAGG, M., The Selection of Engineering Apprentices. *J. Natl. Inst. Ind. Psych.*, 1924, 2, 129-133.
315. TELFORD, F., and Staff, Suggested Tests for Prison Guard. *Pub. Pers. Stud.*, 1924, 2, 61-83.
316. TELFORD, F., and Moss, F. A., Suggested Tests for Supervising Clerk. *Pub. Pers. Stud.*, 1924, 2, 288-297.
317. TELFORD, F., and Moss, F. A., Suggested Tests for Patrolmen. *Pub. Pers. Stud.*, 1924, 2, 112-144.
318. TELFORD, F., and Staff, Suggested Tests for Fire Fighter. *Pub. Pers. Stud.*, 1924, 2, 226-234.
319. THURSTONE, L. L., Intelligence Tests in the Civil Service. *J. Pers. Res.*, 1924, 2, 431-441.
320. THURSTONE, L. L., The Intelligence of Policemen. *J. Pers. Res.*, 1922, 1, 64-74.
321. THURSTONE, L. L., A Comparative Study of Clerical Tests. *Pub. Pers. Stud.*, 1923, 1, Nos. 2-6.
322. THURSTONE, L. L., The Civil Service Test for Patrolmen in Philadelphia. *Pub. Pers. Stud.*, 1924, 2, 1-5.
323. THURSTONE, L. L., Psychology in the Civil Service. *Ann. Amer. Acad.*, 1923, 110, 194-199.
324. TOOPS, H. A., *Tests for Vocational Guidance of Children Thirteen to Sixteen Years*. *Columbia Univ. Cont. to Educ. No. 136*, 1923, pp. 159.
325. TOOPS, H. A., *Trade Tests in Education*. *Columbia Univ. Cont. to Educ.*, 1921, Vol. 115, pp. 118.

326. TRAMM, K. A., Die Bewährung des psychotechnischen Prüverfahren für Strassenbahnfahrer. *Ind. Psychot.*, 1924, 1, 36-42.
327. TRAMM, K. A., Die Rationelle Ausbildung des Fahrpersonals für Strassenbahnen auf Psychotechnischer Grundlage. *Prakt. Psych.*, 1919, 1, Nos. 1-2.
- 327a. TRAMM, A., *Psychotechnik und Taylorsystem*. Berlin: Springer, 1921.
328. TRAMM, A., The Selection and Training of Street-Car Drivers on Psychotechnical lines. *Verkehrstechnik*, 2.
329. TURNER, E. M., The Testimonial as an Advertising Appeal. *J. App. Psych.*, 1922, 6, 191-197.
330. TUTTLE, W. W., The Determination of Ability for Learning Typewriting. *J. Educ. Psychol.*, 1923, 14, 177-181.
331. UYENO, Y., Present Status of Industrial Psychology in Japan. *Psych. Bull.*
332. VERNON, H. M., *Fatigue and Industrial Efficiency*. N. Y.: Dutton, 1922.
333. VERNON, M. D., On Certain Effects of Long Spells of Repetitive Work. *Brit. J. Psych.*, 1926, 16, Part 3.
334. VITELES, M. S., Job Specifications and Diagnostic Tests of Job Competency. *Psychol. Clin.*, 1922, 14, 83-105.
335. VITELES, M. S., Selecting Cashiers and Predicting Length of Service. *J. Pers. Res.*, 1924, 2, 467-473.
336. VITELES, M. S., Research in the Selection of Motormen. Survey of Literature. *J. Pers. Res.*, 1925, 4.
337. VITELES, M. S., Research in the Selection of Motormen. Methods Devised for the Milwaukee Electric Railway and Light Co. *J. Pers. Res.*, 1925, 4, 173-199.
338. VITELES, M. S., Psychology in Business in England, France and Germany. *Ann. Amer. Acad.*, 1923, 110, 207-220.
339. VITELES, M. S., Clinical Viewpoint in Vocational Selection. *J. App. Psych.*, 1925, 9.
340. VITELES, M. S., Standards of Accomplishment. Criteria of Vocational Selection. *J. Pers. Res.*, 1926, 4, 483-487.
341. VITELES, M. S., Application of Psychology in Training Workers. *Lefax*, 1923, 29-36.
342. VITELES, M. S., Job Analysis and Vocational Guidance; The Psychological Viewpoint. *Psychol. Clin.*, 1924, 15, 157-182.
343. WARDEN, RORISON, and SOLINGER, Tendencies in Use of Headlines in Magazine Advertising. *J. App. Psych.*, 1925, 9, 225-230.
344. WEMBRIDGE, H. A., Experiment in Picking Employees. *Amer. Ind.*, 1923, 18-20.
345. WILLIAMS and KNAPP, *Scale for Measuring Skill in Machine Sewing*. Chicago: University of Chicago Press.
346. WILSON, D. R., Need for International Coöperation in Industrial Psychology and Physiology. *J. Natl. Inst. Ind. Psych.*, 1923, 1, 328-332.
347. WITT, R., Industrial Psychology. What it Means. *J. Natl. Inst. Ind. Psych.*, 1924, 2, 75-77.
348. WINKLER, Die Monotonie der Arbeit. *Schrift. z. Psy. Berufs.*, 1922, 19, pp. 45.

349. WOOD, C., Jr., The Printing Trade in Philadelphia. *Psychol. Clin.*, 1924, 15, 182-202.
350. WOODRUFF, W. H., Standardized Stenographic Tests. *J. Pers. Res.*, 1923, 1, 562-567.
351. WUNDERLICH, H., Die Einwirkung Einförmiger Zwangsläufiger Arbeit auf die Persönlichkeitstruktur. *Schrift. z. Psy. Berufs.*, 1925, 31, pp. 53.
352. WYATT, S., Atmospheric Conditions in Cotton Weaving. *Rept. Ind. Fat. Res. Board*, No. 21. London, 1923, pp. 36.
353. WYATT, S., Monotony. *J. Natl. Inst. Ind. Psych.*, 1924, 2, 24-30.
354. YOAKUM, C. S., Applications of Psychology to Industry and Business. *J. Pers. Res.*, 1922, 1, 306-318.
355. YOAKUM, C. S., and BILLS, M. A., Tests for Office Occupations. *Ann. Amer. Acad.*, 1923, 110, 60-74.
356. YOAKUM, C. S., Future Research in Labor Management. *Proc. Soc. of Ind. Eng.*, 1925, 8, 193-201.
357. YOAKUM, C. S., Psychology and Business. *J. Pers. Res.*, 1922, 1, 306-321.
358. YOAKUM, C. S., Experimental Psychology in Personnel Problems. *Bull. Taylor Soc.*, 1925, 10, 8.
359. YOAKUM, C. S., Present Limitations of Psychological Tests in Management. *Am. Mgt. Assn.*, Annual Convention Series, 1925, 21, pp. 3-13.
360. YOUNG, K., New Immigrant and American Industrial Society. *Ind. Psych.*, 1926, 1, 188-203.

